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PLATTSBURGH AIR FORCE BASE
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FIRE TRAINING AREA (FT-002)/ INDUSTRIAL AREA GROUNDWATER OPERABLE UNIT

INTERIM RECORD OF DECISION

Plattsburgh Air Force Base
Installation Restoration Program

FINAL

prepared for:

United States Department of the Air Force
Plattsburgh Air Force Base
Plattsburgh, New York

May 2003

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FIRE TRAINING AREA (FT-002)/INDUSTRIAL AREA GROUNDWATER OPERABLE UNIT

FINAL
INTERIM RECORD OF DECISION

PLATTSBURGH AIR FORCE BASE
PLATTSBURGH, NEW YORK

UNITED STATES DEPARTMENT OF THE AIR FORCE
INSTALLATION RESTORATION PROGRAM

Prepared by:

URS GROUP, INC.

MAY 2003

TABLE OF CONTENTS

		Page No.
ACRONYMS		iv
DECLARATION FOR THE INTERIM RECORD OF DECISION		1
DECISION SUMMARY		6
1.0	SITE NAME, LOCATION, AND DESCRIPTION	6
2.0	HISTORY AND ENFORCEMENT ACTIVITIES	9
3.0	COMMUNITY PARTICIPATION	10
4.0	SCOPE AND ROLE OF OPERABLE UNIT	11
5.0	SITE CHARACTERISTICS	13
5.1	Previous Investigations	13
5.1.1	FT-002 Preliminary Assessment/Site Inspection	13
5.1.2	FT-002 Source OU Investigations and Actions	13
5.1.3	FT-002 Groundwater OU Investigation	14
5.1.3.1	FT-002 Groundwater Remedial Investigation	14
5.1.3.2	Intrinsic Remediation EE/CA	15
5.1.3.3	FT-002 Operable Unit Two Groundwater Feasibility Study	16
51.3.4	FT-002/Industrial Area Groundwater OU Remedial Investigation/Feasibility Study	16
5.1.3.5	Supplemental Surface Water and Groundwater Sampling	17
5.1.4	Other Relevant Investigations	18
5.1.4.1	Site SS-004 (Flightline)	18
5.1.4.2	Sites SS-005 and SS-006 (Non-Destructive Inspection and Aerospace Ground Equipment Facilities)	19
5.1.4.3	Site SS-011 (Defense Reutilization and Marketing Office)	19
5.1.4.4	Site SS-017 (Building 2774)	20
5.1.4.5	Site SD-041 (Building 2612)	20
5.1.4.6	Pump House No. 3	21
5.2	Hydrogeologic Setting	22
5.3	Nature and Extent of Contamination in Groundwater	26
5.4	Future Migration of Contamination in Groundwater	31
6.0	CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES	32
7.0	SUMMARY OF SITE RISKS	33

TABLE OF CONTENTS (Continued)

			Page No.
	7.1	Human Health Risk Assessments	33
	7.2	Ecological Risk Assessments (ERAs)	34
8.0		REMEDIAL ACTION OBJECTIVES	36
9.0		DESCRIPTION OF THE ALTERNATIVES	37
10.0		SUMMARY OF COMPARATIVE ANALYSIS	53
11.0		PRINCIPAL THREAT WASTES	59
12.0		SELECTED INTERIM REMEDY	60
	12.1	Identification of Interim Remedy	60
	12.2	Comparison of the Selected Interim Remedy to Nine USEPA Criteria	68
13.0		STATUTORY DETERMINATIONS	72
14.0		DOCUMENTATION OF SIGNIFICANT CHANGES	75

TABLES

Table 1	Hydrogeologic Units	23
Table 2	Chemicals Detected in Groundwater Near the FT-002 Source Area	27
Table 3	New York State Groundwater ARARs for Primary Contaminants of Concern	29
Table 4	Groundwater and Surface Water Remediation Goals	38
Table 5	Comparison of the Preferred Alternative to USEPA Evaluation Criteria	69
Table 6	Plattsburgh AFB FT-002/IA Groundwater OU Matrix of Cost and Effectiveness Data	73

FIGURES

Figure 1	Location Map	7
Figure 2	Site Features	8
Figure 3	Groundwater Flow and Potential Receptors	24
Figure 4	Conceptual Cross Section	26
Figure 5	Predicted Future Migration of Groundwater Contamination If No Action Taken	30

FIGURES (Continued)

Page No.

Figure 6	Location of Treatment Components for Alternatives 3, 4, 5, 6, and 13.....	41
Figure 7	Location of Treatment Components for Alternatives 7, 8 and 9.....	46
Figure 8	Location of Treatment Components for Alternatives 10, 11 and 12	49
Figure 9	Location of Preferred Alternative Components	62
Figure 10	FT-002/IA Groundwater OU Area of Interim Institutional Controls	63

REFERENCES 73

GLOSSARY 76

APPENDICES

Appendix A Transcript of Public Meeting

Appendix B Responsiveness Summary

ACRONYMS

AFB	Air Force Base
AFRPA	Air Force Real Property Agency
AGE	Aerospace Ground Equipment (facility)
ARARs	applicable and/or relevant and appropriate requirements
BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
BTEX	benzene, toluene, ethylbenzene, xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm/sec	centimeters per second
CT	collection trench
C/Tt	collection/treatment
DCE	dichloroethene
EE/CA	engineering evaluation/cost analysis
ERA	ecological risk assessment
FL	Flightline
FS	feasibility study
FT-002	Fire Training Area
gpm	gallons per minute
HHE	human health and the environment
HRA	human health risk assessment
IA	Industrial Area
IC	institutional control
IROD	Interim Record of Decision
IRP	Installation Restoration Program
L	liter
µg	microgram
MCL	Maximum Contaminant Level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDI	Non-Destructive Inspection (facility)
NPL	National Priorities List
NYCRR	New York Code of Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
O&M	operation and maintenance
OU	operable unit
PA	preliminary assessment
PAH	polycyclic aromatic hydrocarbon
PARC	Plattsburgh Airbase Redevelopment Corporation

ACRONYMS (Continued)

PCB	polychlorinated biphenyl
PTW	permeable treatment wall
RAB	Restoration Advisory Board
RI	remedial investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SI	site inspection
SPDES	State Pollution Discharge Elimination System
SVE	soil vapor extraction
SVOC	semivolatile organic compounds
TBC	To Be Considered
TCE	trichloroethene
TMV	toxicity, mobility, and volume
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VC	vinyl chloride
VOC	volatile organic compounds
WSA	Weapons Storage Area

DECLARATION FOR THE RECORD OF DECISION

Site Name and Location

Plattsburgh Air Force Base
Fire Training Area (FT-002)/Industrial Area Groundwater Operable Unit
Plattsburgh, Clinton County, New York
EPA ID # NY4571924774

Statement of Basis and Purpose

This interim Record of Decision (IROD) presents the selected interim remedial alternative for the Fire Training Area (FT-002)/Industrial Area Groundwater Operable Unit (FT-002/IA Groundwater OU) at the Plattsburgh Air Force Base (AFB) in Plattsburgh, New York. It has been developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for this site, a copy of which is located at the Information Repository at the Feinburg Library on the campus of the State University of New York at Plattsburgh.

The interim remedy has been selected by the United States Air Force (USAF) in conjunction with the United States Environmental Protection Agency (USEPA).

Assessment of the Site

The FT-002 site is an area formerly used by the base fire department for training exercises. Soil and groundwater were contaminated when combustible liquids were released to the environment during the exercises. Remediation at the FT-002 site has been divided into two phases or operable units (OUs) to facilitate remedial activities. The cleanup and control of groundwater contamination located at and downgradient from the FT-002 site is being addressed as part of the FT-002/IA Groundwater OU. The FT-002/IA Groundwater OU also includes groundwater at or near six other Plattsburgh AFB Installation Restoration Program (IRP) sites including:

- SS-004 (Flightline)
- SS-005 (Non-destructive Inspection Facility)
- SS-006 (Aerospace Ground Equipment Facility)
- SS-011 (Defense Reutilization and Marketing Office)
- SS-017 (Jet Engine Inspection and Maintenance Shop)
- SD-041 (Building 2612)

These six sites have been combined with the groundwater portion of FT-002 because they lie downgradient from site FT-002 and contamination from site FT-002 is currently co-mingling with or will potentially co-mingle with groundwater beneath them. This IROD addresses the FT-002/IA Groundwater OU. Cleanup of product (chemicals in pure form not dissolved in water) and contaminated soils at the FT-002 site (the source media for FT-002 groundwater contamination) and cleanup of contaminated soils at the other sites listed above are being addressed as part of separate operable units; separate RODs have been or will be issued for these other operable units.

Groundwater contamination that begins at the source areas and has migrated downgradient includes chlorinated hydrocarbons and fuel-related compounds. Contamination has spread within the unconfined sand aquifer over 1 mile downgradient from the FT-002 site; contaminants have not been found in the underlying till water-bearing zone and carbonate bedrock aquifer. Groundwater is retarded from migrating downward by a low-permeability clay unit which appears to be continuous beneath the sand aquifer. This clay approaches the ground

surface to the east of the base's industrial corridor (east of Idaho Avenue), which limits eastward migration of contamination in groundwater. Offbase groundwater users to the east along Route 9, who utilize the bedrock aquifer for private supply, have not been impacted by the groundwater contamination detected on base. Groundwater contamination is discharging into the Golf Course drainage system, which ultimately flows to Lake Champlain, and the Weapons Storage Area (WSA) drainage system, which ultimately flows to the Salmon River. The interim remedial objectives for the FT-002/IA Groundwater OU are: 1) to prevent ingestion of groundwater containing contaminant concentrations above applicable and/or relevant and appropriate requirements (ARARs); 2) to restore groundwater to ARARs; 3) to prevent migration of groundwater with contaminant concentrations above ARARs beyond base boundaries; and 4) to prevent further impact to surface water that has been impacted by contaminated groundwater.

The response action selected in this IROD is necessary to protect the public health and welfare from releases of hazardous substances into the environment.

Description of the Interim Remedy

The FT-002/IA Groundwater OU is one of the number of operable units for waste sites administered under the Plattsburgh AFB IRP. Records of Decision (RODs) have been signed for fourteen operable units at the base and additional RODs are planned for other IRP sites.

The interim remedy for the FT-002/IA Groundwater OU includes: interim institutional controls (e.g., lease and deed restrictions, dig permit system) to limit the use and discharge of groundwater and to prohibit property development that would interfere with remedial operations, two collection trenches, one located between the runway and flightline and the other along the eastern edge of the flightline; two permeable treatment walls, one located along Idaho Avenue and the other upgradient of the WSA drainage system; extraction wells located in the plume core west of the runway; a groundwater treatment system to treat contaminated groundwater from collection systems discharging to the WSA drainage system; groundwater and surface water monitoring; and five-year site reviews in accordance with Section 121(c) of CERCLA. The interim remedy involves two contingencies that may be implemented during the design of the remedy. These include: 1) a consideration to replace the permeable treatment wall envisioned

along Idaho Avenue with a collection trench and 2) a consideration to treat groundwater from collection systems discharging to the Golf Course drainage system.

Statutory Determinations

This interim action is protective of human health and the environment. The interim action specified in this IROD is an interim solution only, and the interim remedy selected in this IROD is expected to be consistent with the permanent solution that will serve as the final remedy in the final ROD. This action utilizes permanence and treatment technologies to reduce the toxicity, mobility, and volume of contaminants to the maximum extent practicable and thus supports that statutory mandate. Subsequent actions, specifically finalization of final institutional controls and how they are implemented, will be addressed within 6 months of signature on this IROD, in the draft - final ROD for the final response action. Because this interim remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted to ensure that the interim remedy continues to provide adequate protection of human health and the environment, within five years after commencement of the remedial action.

Interim ROD Data Certification Checklist

The following information is included in this IROD. Additional information can be found in the Administrative Record file for this site.

- Chemicals of concern and their respective concentrations (Section 5.0)
- Baseline risk represented by the chemicals of concern (Section 7.0)
- Cleanup levels established for chemicals of concern and the basis for these levels (Table 4)
- How source materials constituting principal threats are addressed (Section 4.0)
- Current and reasonably anticipated future land use assumptions, and current and potential future beneficial uses of groundwater used in the baseline risk assessment and ROD (Sections 6.0 and 7.0)
- Potential land and groundwater use that will be available at the site as a result of the selected remedy (Section 6.0)
- Estimated annual operation and maintenance (O&M) costs (Section 9.0)
- Key factors that led to selecting the remedy (Sections 10.0, 12.0, and 13.0)

Signature: ALBERT F. LOWAS, JR.
Director, Air Force Real Property Agency

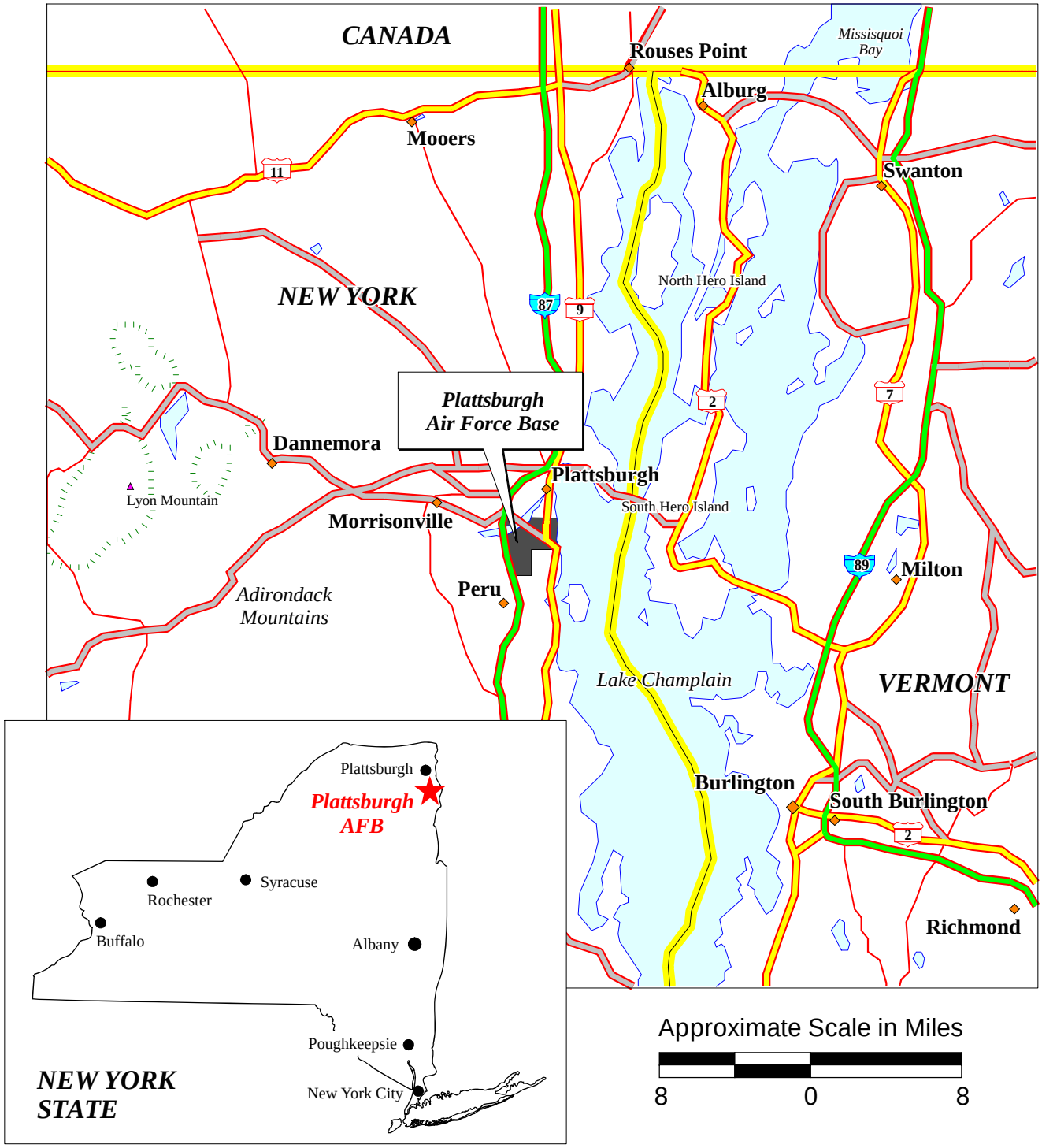
Signature: JANE M. KENNY
USEPA-Region 2, Regional Administrator

DECISION SUMMARY

1.0 SITE NAME, LOCATION, AND DESCRIPTION

Plattsburgh AFB, located in Clinton County in northeastern New York State, is bordered on the north by the City of Plattsburgh, the south by the Salmon River, on the west by Interstate 87, and on the east by Lake Champlain (Figure 1). The base is approximately 26 miles south of the Canadian border and 167 miles north of Albany. Plattsburgh AFB was closed on September 30, 1995 as part of the (third round of) base closures mandated under the Defense Base Closure and Realignment Act of 1993, and its reuse is being administered by the Plattsburgh Airbase Redevelopment Corporation (PARC). As part of the USAF's Installation Restoration Program (IRP) and Base Realignment and Closure (BRAC) Program, Plattsburgh AFB has initiated activities to identify, evaluate, and remediate identified hazardous material disposal sites. The IRP at Plattsburgh AFB is being implemented according to a Federal Facilities Agreement, Docket No.: II-CERCLA-FFA-10201, signed between the USAF, USEPA, and New York State Department of Environmental Conservation (NYSDEC) on July 10, 1991. Plattsburgh AFB was placed on the National Priorities List on November 21, 1989. Cleanup is being funded by the USAF.

The FT-002 site is located approximately 500 feet west of the runway and 500 feet from the base's western boundary (Figure 2). From the mid- to late-1950s through 1989, the site was used to meet the training requirements of the base fire department. During training exercises, fires were ignited in fire training pits on site. As a result of releases of combustible liquids (e.g., off-specification fuel and waste solvents) into the pits, the soil and groundwater have become contaminated with a variety of organic chemicals. Groundwater contamination consists primarily of fuel-related compounds and chlorinated hydrocarbons. The fuel-related compounds are naturally biodegradable in groundwater and are attenuating below detection within 4,000 feet downgradient of the source. The chlorinated hydrocarbons, which are considerably less biodegradable, have been detected over 6,750 feet downgradient of the source. This contamination extends into Plattsburgh AFB's industrial corridor where other sites included in the FT-002/IA Groundwater OU (SS-004, SS-005, SS-006, SS-011, SS-017, and SD-041) are located, as shown on Figure 2. Descriptions of these sites are detailed in Section 5.1.4. The areal boundary of the FT-002/IA Groundwater OU is depicted on Figure 2. This IROD addresses contaminated groundwater from the IRP sites listed above that lie within that boundary.



URS CONSULTANTS, INC.

PLATTSBURGH AIR FORCE BASE
LOCATION MAP

FIGURE 1

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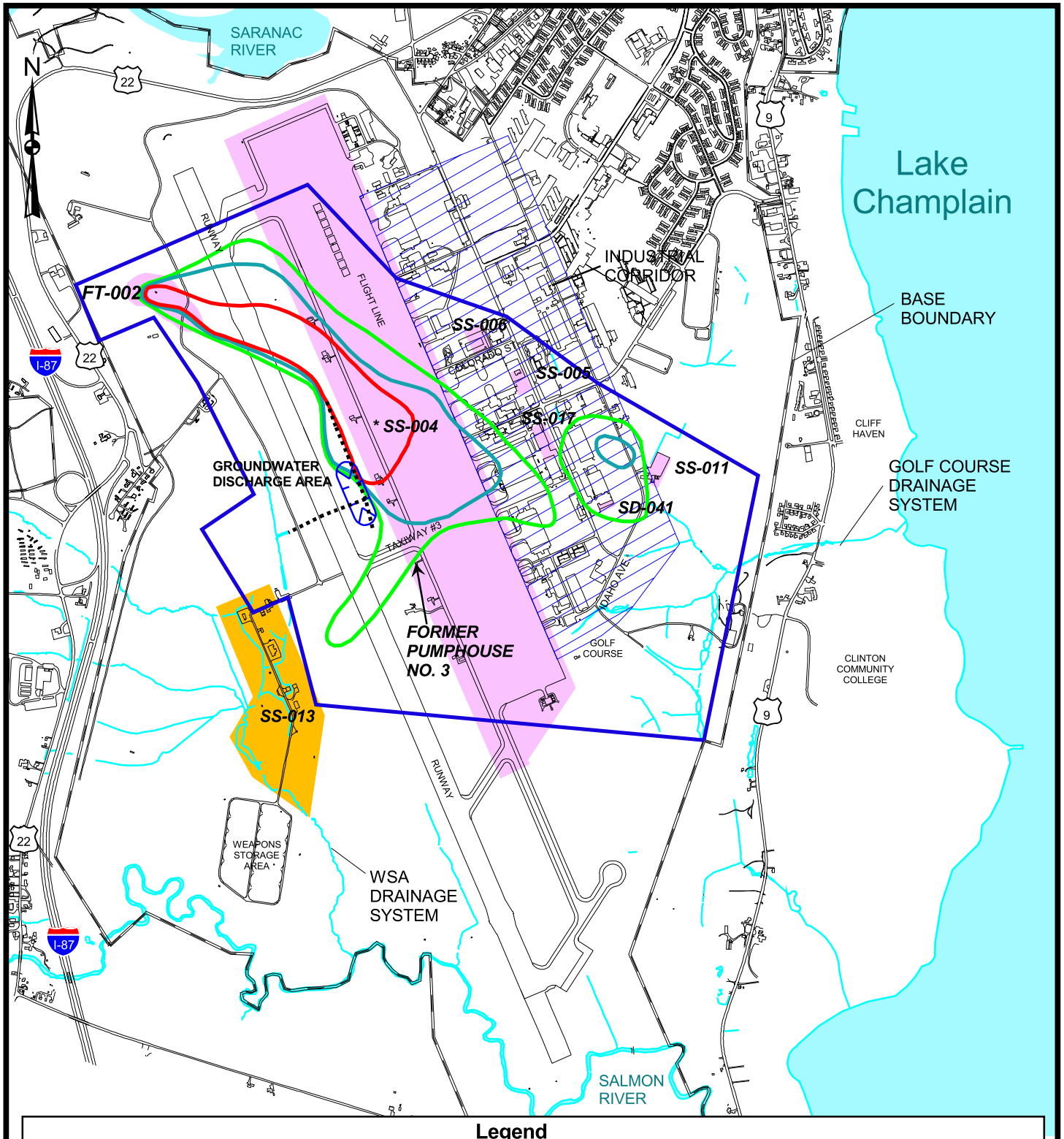


Legend

- Boundary of FT-002/IA Groundwater Operable Unit
- Sites Included in FT-002/IA Groundwater OU
- Other Referenced Sites
- Major Storm Drain

Approximate Extent of Chlorinated Hydrocarbons in Groundwater

- 10 ug/L isopleth
- 100 ug/L isopleth
- 1000 ug/L isopleth

2000 0 2000 Feet

* - Boundary of site SS-004 is outside of the boundary of the FT-002/IA Groundwater OU. However the sources of groundwater contamination associated with SS-004 are within the boundary of the FT-002/IA Groundwater OU (See Figure 5).

URS Consultants, Inc.	PLATTSBURGH AIR FORCE BASE SITE FEATURES	FIGURE 2

J:\0100013\DB\GIS\1999\wgoperunit.apr SITE FEATURES 3/28/2002

2.0 HISTORY AND ENFORCEMENT ACTIVITIES

Groundwater contamination that begins at the FT-002 source area and has migrated downgradient includes chlorinated hydrocarbons and fuel-related compounds. This contamination co-mingles with similar contamination present in groundwater as a result of activities at other IRP sites located east of the FT-002 site. Investigation and remedial activities that have been undertaken at various sites to address this groundwater contamination and the soil sources for this contamination are listed below. These activities are described in greater detail in Section 5.1.

Timeframe	Activity	Description
1984-1985	FT-002 Preliminary Assessment/SI (E.C. Jordan 1989)	Limited soil and groundwater sampling in FT-002 source area
1988-1993	FT-002 Source OU RI (ABB-ES & URS 1993a)	Extensive soil sampling in FT-002 source area
1990	FT-002 Source Product Recovery EE/CA (E.C. Jordan 1990)	Evaluation of product recovery in FT-002 source area leading to installation of product recovery system
1991-1992	SS-011 RI (ABB-ES & URS 1992)	Evaluation of soil and groundwater contamination at SS-011
1989-1993	FT-002 GW OU RI (ABB-ES & URS 1993b)	Evaluation of groundwater contamination attributed to FT-002 west of the industrial corridor
1994-1995	FT-002 GW OU FS (URS 1995c)	Evaluation of remedial alternatives for groundwater west of the industrial corridor
1994-1995	SS-004 RI (URS 1995b)	Evaluation of soil contamination in the flightline vicinity
1995	FT-002 Source OU FS (URS 1995a)	Evaluation of remedial alternatives for FT-002 source control leading to a ROD
1993-1996	SS-005, SS-006 and SS-017 (Malcolm Pirnie 1996)	Investigation of soil and groundwater contamination at 3 industrial area sites
1993-1997	FT-002 Intrinsic Remediation EE/CA (Parsons 1995 & 1997)	Evaluation of contaminant biodegradation in theFT-002 groundwater plume
1996	FT-002 Source OU Action Memo (Parsons & OHM 1996)	Selection of technology for FT-002 source control leading to installation of removal action systems
1995-2001	FT-002/IA Groundwater OU RI/FS (URS 2001d)	Comprehensive groundwater investigation and evaluation of remedial alternatives
1999-2001	Supplemental Evaluation to the EBS (URS (2001e)	Preliminary evaluation of groundwater contamination at SD-041 (Building 2612)
2001	SS-017 SE/FS (URS 2001c)	Evaluation of soil contamination at site SS-017
2001	SD-041 RI (URS 2002c)	Evaluation of soil and sediment contamination at site SD-041
2001	Pump House No. 3 Investigation (URS 2001b)	Evaluation of groundwater contamination detected near former Pump House No. 3
2001	FT-002 Source OU ROD (URS 2001a)	Selection of alternative to remediate FT-002 source contamination

3.0 COMMUNITY PARTICIPATION

The USAF has kept the community informed regarding progress at site FT-002 and the other sites in the FT-002/IA Groundwater OU during quarterly Restoration Advisory Board (RAB) meetings open to the public. This board consists of the BRAC Cleanup Team (BCT) members (key representatives from the USAF, USEPA, and NYSDEC) and representatives from municipalities, community organizations, and associations including community members with environmental/engineering expertise. The RAB, which was chartered in 1995, serves as a forum for the community to become familiar with the restoration activities ongoing at Plattsburgh AFB and to provide input to the BCT. In addition to the formal quarterly meetings, several "working group" meetings were held in 1999, on base or on site, specifically to discuss outstanding issues regarding the FT-002 site among RAB members. Each RAB member was provided with full copies of the Draft-Final and Final Remedial Investigation/Feasibility Study (RI/FS) on CD-ROM.

The RI/FS, the Proposed Plan (URS 2002), and other site-related documents in the Administrative Record have been made available to the public. The full-length reports have been available at the Information Repository located at the Feinberg Library on the Plattsburgh campus of the State University of New York. The notice of the availability of these documents was published in the Plattsburgh *Press Republican* Newspaper on January 22, 2002. In addition, a 30-day public comment period was held from January 22, 2002 to February 20, 2002 to solicit public input on the FT-002/IA Groundwater OU Proposed Plan. During this period, the public was invited to review the Administrative Record and comment on the preferred alternative being considered.

In addition, Plattsburgh AFB hosted a public meeting on February 4, 2002 at the Old Court House, Second Floor Meeting Room, 133 Margaret Street. The date and time of the meeting was published in the Plattsburgh *Press Republican* Newspaper. The meeting was divided into two segments. In the first segment, data gathered at the site, the preferred alternative, and the decision-making process were discussed. In the second segment, immediately after the informational presentation, Plattsburgh AFB held a formal public meeting to accept comments about the interim remedial alternative being considered for the FT-002/IA Groundwater OU. The meeting provided the opportunity for people to comment officially on the plan. Public comments have been recorded and transcribed, and a copy of the transcript has been added to the Administrative Record and Information Repository. This transcript is included as Appendix A of this IROD. Public comments on the Proposed Plan, and USAF responses to those comments, are summarized in the responsiveness summary, which is included as Appendix B.

4.0 SCOPE AND ROLE OF OPERABLE UNIT

Site FT-002 is one of a number of sites administered under the Plattsburgh AFB IRP. RODs have previously been signed for 14 OUs at the base and additional RODs are planned for other IRP sites. Because of the complex nature of the FT-002 site, site remediation was divided into two OUs:

- FT-002 Source OU
- FT-002 Groundwater OU

Further, because groundwater contamination from site FT-002 is currently impacting or will potentially impact groundwater beneath several IRP sites in the industrial corridor, the USAF, in conjunction with NYSDEC and USEPA, expanded the FT-002 Groundwater OU to include the groundwater portions of these affected sites. The expanded operable unit, called the FT-002/IA Groundwater OU, includes seven IRP sites (FT-002, SS-004, SS-005, SS-006, SS-011, SS-017, and SD-041). Only groundwater associated with these sites is included in the FT-002/IA Groundwater OU, which is the subject of this IROD. This OU addresses cleanup and control of contamination dissolved within groundwater (mainly chlorinated hydrocarbons and fuel-related contaminants) resulting from the FT-002 source area and other source areas that lie downgradient from the FT-002 site. The principle threats of contamination in groundwater are its potential to be ingested by humans and its potential to migrate to surface water bodies.

The current extent of groundwater contamination above ARARs (shown on Figure 2) includes a plume that extends from the FT-002 site into the industrial corridor and a smaller contaminated area near the southeast corner of the industrial corridor. The boundary of the FT-002/IA Groundwater OU (Figure 2) extends beyond the current limits of groundwater contamination to account for uncertainties associated with groundwater transport modelling and future contaminant migration, and to insure that remedial measures (including deed and lease restrictions pertaining to groundwater use) are and will continue to be protective of public health and the environment.

This interim action and the expected final remedy for the FT-002/IA Groundwater OU will addresses the principal threats by restoring the aquifer to drinking water quality over time, and by controlling and treating groundwater discharge to surface water bodies.

The soil media at each of the sites included in the FT-002/IA Groundwater OU are being addressed separately from the FT-002/IA Groundwater OU. The FT-002 Source OU addresses cleanup and control of product and contaminated soils at the FT-002 source area (from the ground surface vertically downward to a depth at which soil has been directly contaminated by free product to the lowest point of water table fluctuation). RODs already have been executed for the SS-005 Soil OU, the SS-006 Soil OU, the SS-017 Soil OU, SS-011, and the FT-002 Source OU. Analysis leading to RODs is underway for Soil OUs for sites SS-004 and SD-041. The selection of an interim remedy for the FT-002/IA Groundwater OU considers the actions that have been or are anticipated to be undertaken at these other sites.

In order to initiate cleanup of the FT-002/IA Groundwater OU as expeditiously as possible, this IROD includes the physical remedy portion of Alternative 13 (Collection/Treatment Between the Runway and Flightline, East Flightline Collection Trench, Idaho Avenue Permeable Treatment Wall, WSA Permeable Treatment Wall, and Pumping of the Core) and interim institutional controls, as the interim remedy for the FT-002/IA Groundwater OU. The interim institutional controls are needed to minimize the exposure of any future users of property encompassed by the FT-002/IA Groundwater OU, including USAF personnel and lessees/sublessees, and to maintain the integrity of the interim remedial action until the final remedy is selected and the remedial action is complete. Final institutional controls and how they are to be implemented will be addressed in the final ROD. The interim action specified in this IROD is an interim solution only, and the interim remedy specified in this IROD is expected to be consistent with the permanent solution that will serve as the final remedy in the final ROD.

5.0 SITE CHARACTERISTICS

Chlorinated hydrocarbons and fuel-related compounds spilled at the FT-002 site have co-mingled with similar contamination present in groundwater from other sites to the east. Past investigations at the FT-002 site and other relevant sites (Section 5.1), the hydrogeologic setting (Section 5.2), the nature and extent of groundwater contamination (Section 5.3), and the potential for future migration of contamination (Section 5.4) are summarized below.

5.1 Previous Investigations

5.1.1 FT-002 Preliminary Assessment/Site Inspection

In 1984-85, a preliminary assessment (PA) consisting of primarily a records search was conducted for FT-002. Based upon the results of the PA, a site inspection (SI) was conducted in 1987 (E.C. Jordan 1989). It included the advancement of three borings completed as monitoring wells, soil sampling, an active soil gas survey, and geophysical surveys. The study confirmed the presence of fuel-related compounds and solvents in the subsurface soil. In addition, free product was detected floating on the water table surface.

Following the SI, further analysis of contamination related to site FT-002 was divided into two OUs: Source and Groundwater. From that point, implementation and documentation of investigations and remediation for the two OUs have proceeded along separate paths.

5.1.2 FT-002 Source OU Investigations and Actions

From 1988 to 1993, a multi-phased RI was undertaken to investigate soil contamination and the presence of free product at the FT-002 site (ABB-ES & URS 1993a). The comprehensive study examined the vertical and horizontal extent of soil contamination by soil sampling. The study also included an evaluation of human and ecological health risks posed by the contaminants attributed to FT-002. Supplemental soil sampling was undertaken at the FT-002 site in 1997 (URS 1998c) and 1999 (Hunt 1999).

In 1990, an Engineering Evaluation/ Cost Analysis (EE/CA) was prepared to evaluate alternatives for the recovery of free floating product from the FT-002 site (E.C. Jordan 1990). As a result of the fire training exercises, product migrated vertically from the ground surface to the water table and formed a floating layer on the water table. Based on the EE/CA results, the USAF implemented a removal action in June 1992. A groundwater treatment plant and product recovery system were constructed and went on-line in 1993. The system was upgraded in 1996. Over 20,000 gallons of product have been collected to date.

In 1995, a FS was completed which included a detailed evaluation and comparison of nine alternatives to remediate FT-002 soil based on USEPA's nine criteria related to the effectiveness, implementability, and cost of the alternatives (URS 1995a).

In 1996, an Action Memorandum was prepared which included a recommendation and conceptual design for a removal action to address contaminated soil (Parsons & OHM 1996). The removal action, which was implemented later that year, consisted of soil vapor extraction (SVE) to address chlorinated hydrocarbon contaminants, bioventing to address fuel-related contamination, control of the water table surface using groundwater extraction wells and a groundwater treatment plant constructed for the product removal action.

A Proposed Plan for the FT-002 Source OU (URS 2000b) was prepared and presented to the public at a public meeting on December 14, 2000. The proposed remedy included a combination of SVE and bioventing of contaminated soil, free product collection, water table depression enabling remediation of residual product adhering to soil below the water table, hydraulic containment of the source, institutional controls, progress monitoring and sampling, and five-year reviews. A ROD for the FT-002 Source OU was prepared following public comment on the Proposed Plan and signed in March 2001 (URS 2001a).

5.1.3 FT-002 Groundwater OU Investigation

5.1.3.1 FT-002 Groundwater Remedial Investigation

As a follow-up to the SI, a multi-phased FT-002 groundwater RI (ABB-ES & URS 1993b) was undertaken to address the nature and extent of contamination in groundwater

attributable to FT-002. The RI identified the primary contaminants associated with the FT-002 groundwater plume as being trichloroethene (TCE), dichloroethene (DCE), and the fuel-related compounds benzene, toluene, ethylbenzene, and xylenes (collectively known as BTEX). TCE and DCE are chlorinated hydrocarbons. Other organic and inorganic compounds were limited in extent to the area close to the FT-002 source. The study concluded that the dissolved plume of chlorinated hydrocarbons extended from the FT-002 site eastward to beneath the flightline ramp. The surface water sampling also indicated that groundwater contaminants were being discharged to a storm drain between the runway and flightline which flows to surface water at the WSA.

As part of the study, the health risk posed to potential human receptors was assessed. The assessment concluded that using groundwater contaminated by the FT-002 site for potable use could pose a significant threat to human health. It is important to note that the portion of the aquifer contaminated by the FT-002 plume currently is not used as a potable supply source—a public water supply is available.

5.1.3.2 Intrinsic Remediation EE/CA

In 1993 and 1994, an Intrinsic Remediation EE/CA was conducted (Parsons 1995). The purpose of the study was to determine whether naturally-occurring attenuation processes for fuel hydrocarbons were occurring in groundwater at the site and to evaluate the impact of these processes on contaminant migration. The effort was part of a greater study by the USAF to evaluate natural attenuation processes at bases across the country. This report provided valuable data concerning the size and strength of the contaminant source, the observed mechanics of biodegradation of fuel, the possible co-metabolism of chlorinated hydrocarbons, and the extent of contamination. The report indicated that geochemical data strongly suggests that BTEX is biodegrading; modeling data predicted that the BTEX plume would not migrate further. It was also concluded that chlorinated hydrocarbons are biodegrading by anaerobic cometabolic processes within the BTEX plume. Some of this data was used in the FT-002/IA Groundwater OU RI/FS (Section 2.3.4) – in particular to develop the groundwater transport model. An addendum to the study was issued in 1997 (Parsons 1997c).

5.1.3.3 FT-002 Operable Unit Two Groundwater Feasibility Study

In 1994-1995, an FS was conducted which evaluated ten alternatives to cleanup contaminated groundwater associated with FT-002 and compared the alternatives to USEPA's nine criteria for evaluating remedial alternatives (URS 1995c). This study was based on the initial FT-002 groundwater RI report (ABB-ES & URS 1993b). The FS did not make a recommendation regarding a preferred alternative.

5.1.3.4 FT-002/Industrial Area Groundwater OU Remedial Investigation/Feasibility Study

Following the issuance of the FS, it was determined by the USAF, in conjunction with the NYSDEC and USEPA, that the groundwater operable unit for FT-002 should be expanded to include potentially impacted groundwater in the industrial corridor. As shown in Figure 2, the FT-002 groundwater contaminant plume has entered the western portion of the industrial corridor. In addition, a significant area of contaminated groundwater is located in the eastern portion of the industrial corridor as a result of spills occurring within the corridor; the FT-002 plume is migrating eastward and mingling with this contamination. It was also apparent that additional data were necessary to reasonably predict potential future movement of groundwater contamination, and to adequately assess potential impact on offbase groundwater users and surface water bodies. Therefore, a comprehensive large-scale study was initiated.

The study (URS 2001d), which included both RI and FS components, provides the primary basis for remedy selection in this IROD. The RI described the geologic, hydrologic, and chemical conditions of groundwater; described potentially impacted human and ecological populations; numerically modeled the future disposition of contamination in groundwater; and evaluated potential risk to human health and the environment. The FS used the results of the RI to establish remedial goals, evaluate remedial alternatives, and recommended an appropriate remedial action.

The field investigation and data compilation phases of the RI were conducted to fill in data gaps remaining from previous investigations and to address USAF, USEPA, and NYSDEC concerns. Several phases of field investigation activities were conducted between December 1995 and August 1999. Activities consisted of:

- A potable well survey at over 50 residences and commercial properties along Route 9
- A rapid bioassessment (a screening level evaluation to determine whether biological impairment exists as a result of chemical releases from the area of study) of aquatic resources along the WSA and Golf Course surface water drainage systems
- Seismic and azimuthal resistivity geophysical surveys
- Installation of four borings and 44 monitoring wells and piezometers
- Geotechnical analyses
- Aquifer testing including slug tests, packer tests, and one pumping test
- Water level monitoring
- Collection and analysis of groundwater samples from about 100 wells and piezometers
- Soil gas surveys and soil sampling to attempt to identify a groundwater contamination source area upgradient of SS-011
- Stream flow measurements in the Golf Course and the Weapons Storage Area Drainage streams and the storm drainage culvert south of taxiway #1
- Geologic field reconnaissance and mapping
- Surveying and topographic mapping
- Advancement of three borings along the eastern base boundary to gather data on the depth and continuity of the clay confining layer
- A topographic survey of a large drainage basin between the runway and flightline ramp and the locations and elevations of storm sewer drainage features within this basin.

Data were analyzed using a comprehensive database of groundwater information that was collected over time, basewide. The hydrogeologic and chemical conditions of groundwater are presented in Section 5.0 of this IROD. A summary of human and ecological risk is given in Section 7.0. A summary and an evaluation of alternatives are presented in Sections 9.0 and 10.0, respectively.

5.1.3.5 Supplemental Surface Water and Groundwater Sampling

The USAF has conducted periodic surface water and groundwater sampling at key locations on the base, and will continue to do so until a remedial action for the FT-002 Groundwater OU is formalized. The purpose of the sampling has been to provide a level of comfort to interested parties, including regulatory agencies and the community, and that surface

water contaminants in the Golf Course and WSA drainage systems, and groundwater contaminants are not migrating off base. Since February 1998, 18 surface water sampling events (at four locations) and seven groundwater sampling events (at 14 locations) have been undertaken. The latest available data was collected in December 2001 (URS 2002b). Surface water results indicated that only one area of the WSA stream contains contamination above regulatory limits. Contamination was not detected in the groundwater wells sampled, indicating that eastward migration of groundwater contamination off base is not occurring.

5.1.4 Other Relevant Investigations

Described below are investigations related to the six sites other than FT-002 that be included in the FT-002/IA Groundwater OU. One other site (Pump House No. 3) that is situated within the boundaries of the FT-002/IA Groundwater OU, but not considered part of the OU, is also discussed.

5.1.4.1 Site SS-004 (Flightline)

Groundwater at site SS-004 has been included in the FT-002/IA Groundwater OU (Figure 2). Two studies were conducted within the boundaries of site SS-004 that evaluated potential sources for groundwater contamination at the site. The first was the SS-004 Remedial Investigation (URS 1995b). In addition, extensive investigation of soil contamination was undertaken underneath the flightline ramp and near the pumphouses and underground storage tanks along the western edge of the flightline as part of the closure of the aircraft refueling system (OHM 2000). Several hundred soil and groundwater samples were collected during these studies. Based on these studies, the primary sources of chlorinated hydrocarbon contamination at SS-004 appear to be two former concrete-lined drainage trenches that spanned the entire north-to-south length of the flightline ramp. Aircraft degreasing activities, that may have introduced contamination into the trenches, occurred on the ramp between Colorado Street and Taxiway #3 (Figure 2). These trenches were abandoned by filling them in with concrete circa 1970. Evaluations which will result in a ROD for the SS-004 Soil OU are ongoing.

5.1.4.2 Sites SS-005 and SS-006 (Non-Destructive Inspection and Aerospace Ground Equipment Facilities)

The Non-Destructive Inspection Facility (NDI), site SS-005, was a facility used for nondestructive x-ray inspection of aircraft parts. A waste accumulation area was previously located on site. Materials used and stored at this facility included PD-680 cleaning solvent, engine oil, 1,1,1-trichloroethane, developer, dye penetrant fluid, remover, and photographic fixer solution.

The Aerospace Ground Equipment Facility (AGE), site SS-006, was a facility used for the maintenance and repair of ground power carts that provided electrical and pneumatic power to parked aircraft. Building 2801, where aircraft maintenance tools were calibrated, is also included in site SS-006. SS-006 is the location of one of the hazardous waste accumulation points on the base. The point accepted hazardous waste from satellite accumulation points at the AGE and at Building 2801. Underground diesel fuel tanks, an oil/waste separator in an underground holding tank were also formerly located on site.

The groundwater at sites SS-005 and SS-006 has been included in the FT-002/IA Groundwater OU. Site inspections were conducted at sites SS-005 and SS-006 in 1987 (E.C. Jordan 1989). Between October 1992 and February 1995, an RI was performed at the sites which included a health risk assessment for the two sites combined. Monitoring wells were installed, and soil and groundwater samples were collected. Based on the evaluation presented in the RI Report (Malcolm Pirnie 1996), RODs were executed for each of the SS-005 and SS-006 Soil OUs (URS 1998a and URS 1998b). The selected remedies for both sites were institutional restrictions to limit development to non-residential use and prohibition of the installation of wells for drinking water. Because groundwater contamination at the sites was attributed to the FT-002 site, groundwater remedial actions were deferred to the FT-002/IA Groundwater OU.

5.1.4.3 Site SS-011 (Defense Reutilization and Marketing Office)

Site SS-011, the Defense Reutilization and Marketing Office, is located on the eastern side of the base near Idaho Avenue. Several investigations and soil removal actions were conducted at SS-011 between 1984 and 1992 in response to polychlorinated biphenyl (PCB) and

pesticide spills at the site. During the RI (ABB-ES & URS 1992), chlorinated hydrocarbons were detected in groundwater. Since the concentrations of the chlorinated hydrocarbons clearly increased upgradient from the site, the contamination was attributed to an upgradient source. Post- removal action sampling and health risk analysis substantiated the adequacy of the soil removal actions. Therefore, a ROD for Site SS-011 specifying no further action was executed (URS 1993). This ROD did not distinguish between soil and groundwater OUs. Contamination detected upgradient from and at site SS-011 is being addressed in the FT-002/IA Groundwater OU.

5.1.4.4 Site SS-017 (Building 2774)

The former Jet Engine Inspection and Maintenance Shop (Building 2774) is located in the industrial corridor near the southernmost extent of the FT-002 chlorinated hydrocarbon groundwater plume. Solvent and petroleum product spills occurred in the parking lots in the vicinity of the building. An RI was conducted at the site between 1992 and 1995 (Malcolm Pirnie 1996). In 1992, 200 cubic yards of contaminated soil (contaminated mainly by BTEX and dichlorobenzenes) were removed from the site. In 1997, several treatment systems were installed (and are currently operating) as part of an additional removal action at the site to cleanup the remaining soil contamination (OHM 1997b). Some of the major contamination of concern in soil at the beginning of the removal action included TCE, BTEX, and dichlorobenzenes. The treatment systems include soil vapor extraction, biosparging, and bioventing. Although relatively high levels of chlorinated hydrocarbons and other volatile organic compounds (VOCs) were detected in groundwater at the site during the RI, more recent groundwater sampling has indicated that the source removal actions have helped reduce groundwater contaminant levels to near or below ARARs (URS 2001c). A ROD for the SS-017 Soil OU was signed in 2002. Because the site lies directly and immediately downgradient from the FT-002 groundwater plume, the groundwater OU for SS-017 site has been combined with the FT-002/IA Groundwater OU.

5.1.4.5 Site SD-041 (Building 2612)

In 1998 and 1999, 15 monitoring wells were installed and sampled to investigate groundwater around Building 2612 (SD-041), a former Base Equipment and Supply Warehouse located near the intersection of Arizona and Idaho Avenues. The investigation was undertaken as part of a Supplemental Evaluation to the Plattsburgh AFB Environmental Baseline Survey (URS

2001e). The results indicated that the groundwater near the site is being impacted by an upgradient groundwater chlorinated hydrocarbon plume. However, the contaminant distribution also indicated that a source in the vicinity of Building 2612 is contributing to the observed contamination. Contaminant transport modeling indicated that groundwater beneath site SD-041 will be impacted by the FT-002 chlorinated hydrocarbon plume well into the future. Therefore, groundwater contamination in this area is included in the FT-002/IA Groundwater OU. A Remedial Investigation to further evaluate the source of the groundwater contamination and the nature and extent of soil and sediment contamination at SD-041 is currently underway (URS 2002c).

5.1.4.6 Pump House No. 3

Pump House No. 3 was formerly located along the western edge of the flightline ramp immediately south of taxiway 3 (Figure 2) and included six 50,000 gallon and one 2,000 gallon underground fuel storage tanks (USTs). In November 1968, the pump house was destroyed by fire during which jet fuel may have been released. In addition, a small fuel spill occurred in this area in 1994. In 1994, the seven USTs at the former Pumphouse No. 3 were removed. The tanks were originally used (beginning in 1956) for storage of jet fuel, but were later used (beginning in the early 1970s) for storage of heating fuel and waste fuels until 1994; these tanks were tightness tested annually, from 1991 through 1994, and found to be intact. Following the removal of the USTs, soil and groundwater samples were collected using Geoprobe sampling techniques. BTEX compounds were detected at significant levels in several of the samples. The magnitude and extent of groundwater contamination was not determined. The BTEX contamination appeared located immediately south of a portion of the FT-002 chlorinated hydrocarbon plume traveling toward the WSA drainage system (see Figure 2).

In 2001, an investigation of the groundwater contamination in the vicinity of Pump House No. 3 was conducted. The investigation included analyzing 131 groundwater-screening samples collected from 55 borings for BTEX and chlorinated hydrocarbons, installation of 6 monitoring wells, and analyzing groundwater from the 6 wells and 2 samples collected from the adjacent storm drainage system for VOCs. A report of results (URS 2001b) was submitted to NYSDEC and USEPA.

Based on the groundwater screening and monitoring well sampling results, it was concluded that BTEX contamination originating from former Pump House No. 3 is limited in areal extent to within 450 feet from the pump house. The contamination is likely in an equilibrium state as evidenced by the likely age of the spill at the pump house (over 30 years) and high biological activity (indicated by oxygen depleted conditions). The plume of chlorinated hydrocarbons appears to trend separately from the BTEX contamination from the pump house (at a greater depth and to the north). Because the BTEX contaminants are not likely to migrate any farther downgradient and groundwater is not likely to be utilized at this location in the future, active remediation of the BTEX plume was not recommended. The NYSDEC Region 5, Office of Environmental Quality concurred with the conclusions of the report on December 4, 2001. NYSDEC also recommended that monitoring of 9 wells and 2 storm drain locations be conducted every 6 months for at least 2 years. Monitoring for this site will be accomplished in coordination with the NYSDEC Region 5 Office of Environmental Quality.

5.2 Hydrogeologic Setting

Groundwater in the vicinity of Plattsburgh AFB occurs in both overburden deposits and bedrock. Hydrologically, the stratigraphic sequence can be divided into the following units from top to bottom: the unsaturated zone, the unconfined sand aquifer, the clay confining layer, the confined till water-bearing zone, and the confined bedrock aquifer. Groundwater movement in these units is controlled by aquifer characteristics, infiltration, and run-off. Borings and monitoring wells were advanced within each of these units to characterize them during the RI/FS (URS 2001d). The units are described in Table 1.

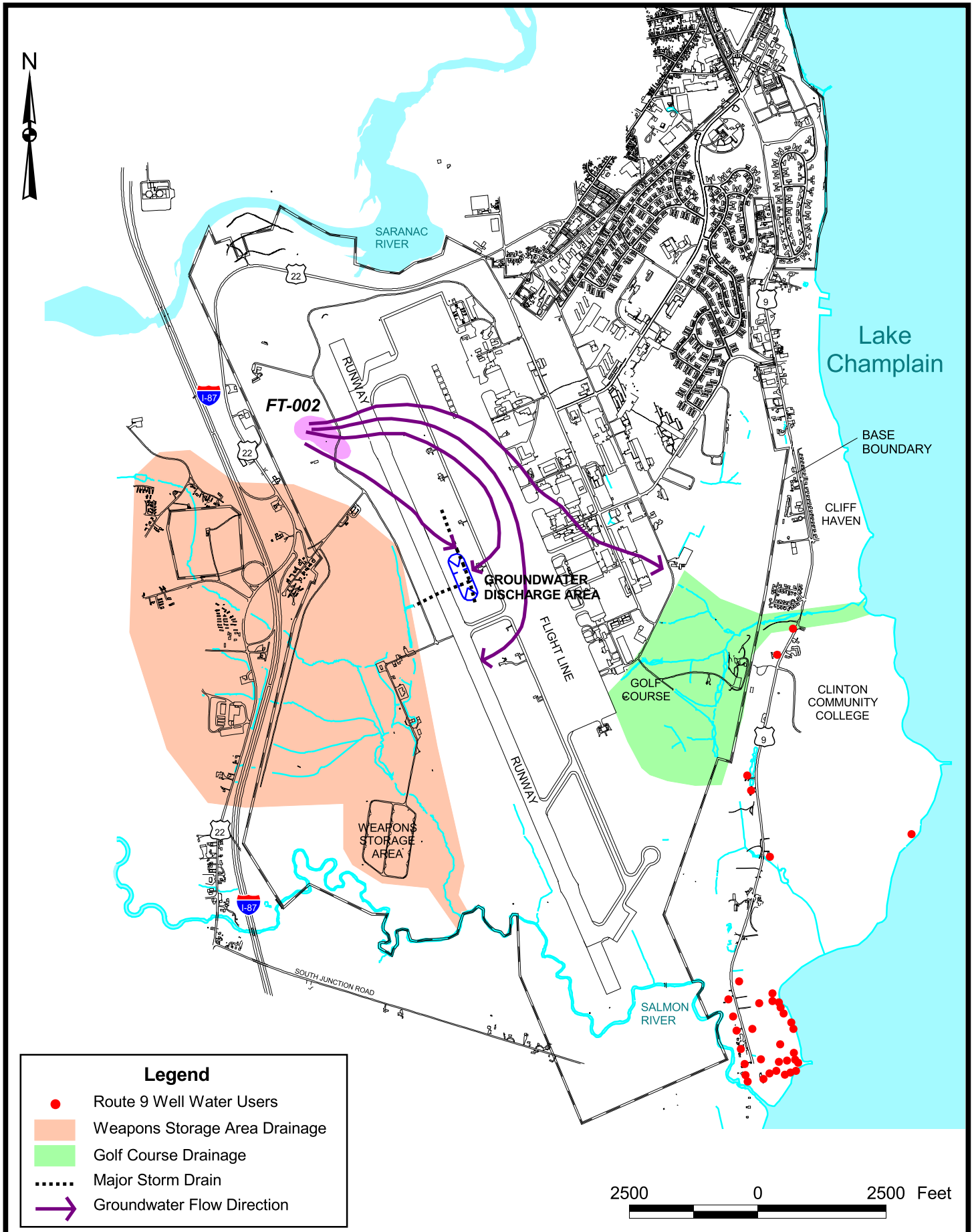
Groundwater flow from FT-002 is multi-directional, as indicated in Figure 3. Contamination has been detected only in the unconfined sand aquifer and flow into the underlying till water-bearing zone and bedrock aquifer is limited by the clay confining unit. The predominant flow direction from FT-002 is southeastward; much of the groundwater flow is directed toward a deep drainage basin that is situated between the runway and the flightline. The groundwater in this vicinity is diverted to the WSA drainage system by a large storm sewer. Some of the groundwater is not affected by the deep drainage basin and travels southward then southwestward around the deep drainage basin and discharges directly into the WSA drainage

TABLE 1
HYDROGEOLOGIC UNITS

Hydrogeologic Unit	Description	Hydraulic Conductivity	No. of Wells or Borings
Unsaturated Zone	The unsaturated zone lies between the ground surface and the water table. It lies entirely within the sand unit, except in the southeastern portion of the base where the water table surface may intersect clay, till, or bedrock. This zone ranges in thickness from 1 to 50 feet.	---	Over 400 borings
Unconfined Sand Aquifer	The unconfined aquifer, contained in the sand unit, has the water table as its upper bound and the clay confining layer as its lower bound. The saturated thickness of the aquifer is greatest in the northwest and north-central portions of the base (at over 50 feet), and decreases to the north, east, and south (being less than 5 feet in the vicinity of the golf course and the southern end of the flightline and runway). The unconfined aquifer is limited to the north and south by the Saranac and Salmon Rivers, respectively. Their river valleys cut through the sand into the underlying clay unit. Lake Champlain and bedrock outcrops east of the golf course limit the unconfined aquifer to the east and southeast. **The FT-002 contaminant plume is contained within this unit.**	10^{-2} to 10^{-4} cm/sec	321 monitoring wells
Clay Confining Unit	The clay unit forms a low permeability confining layer that separates the sandy unconfined aquifer from the till and bedrock below. The clay confining layer is believed to be continuous beneath the base; it is known to be absent only in the Saranac River valley and where bedrock outcrops. The clay was found in thicknesses up to 30 feet.	10^{-8} cm/sec	21 borings
Confined Till Water-Bearing Zone	The till water-bearing zone is confined by the overlying clay unit. It is isolated from the sand aquifer above, but is in immediate contact with the bedrock below. Vertical flow from the till toward the sand above appears upward except in a portion of the flightline industrial corridor. This unit is heterogeneous in composition (silty gravel to gravelly silt) and ranges widely in thickness (3 to 182 feet)	10^{-4} cm/sec	6 wells; 20 borings
Confined Bedrock Aquifer	The bedrock aquifer is isolated from the unconfined sand aquifer by the overlying clay unit. Groundwater movement in the bedrock, which is variably fractured limestone and dolostone, is controlled by the secondary porosity features of the rock such as fractures, faults, bedding planes, joints, and solution cavities. Regional groundwater flow in the bedrock aquifer is generally to the east and southeast toward Lake Champlain. Artesian flow occurred from several wells installed at the golf course and along the southern end of the flightline and runway.	10^{-2} to 10^{-6} cm/sec	15 wells

Notes: Hydraulic conductivity is a measure of the ability of a unit to allow water to flow through it. The higher the number (e.g., 10^{-2}), the quicker water will pass through the unit. The lower the number (e.g., 10^{-7}), the slower water will pass through the unit.

cm/sec = centimeter per second



J:\0100013\DB\GIS\1999\wgoperunit.apr POTENTIAL RECEPTORS 9/28/2000

URS Consultants, Inc.	GROUNDWATER FLOW AND POTENTIAL RECEPTORS	FIGURE 3

system (Figure 3). The streams of the WSA drainage system eventually converge and discharge into the Salmon River.

Some of the groundwater from the FT-002 site is not affected by the deep drainage basin and travels southeastward through the flightline into the industrial corridor. A geologic cross-section along this southeastward flow path is depicted in Figure 4. Near the southeastern boundary of the base, the unconfined sand aquifer thins, and clay and bedrock are found at or near the surface. Groundwater from the industrial corridor discharges into the Golf Course drainage system. The several streams in this drainage system converge near the Barracks Golf Course Clubhouse and discharge via a stream that runs just south of Cliffhaven into Lake Champlain.

Some residences near Plattsburgh AFB rely on private groundwater wells for their potable water supply. To identify commercial and residential groundwater well users downgradient from the FT-002 site, a house-to-house water use survey was conducted during the RI/FS (URS 2001d). These well users are shown in Figure 3. Elsewhere offbase and onbase downgradient from the FT-002 site, a public water line is available for residences and businesses. The geologic configuration, groundwater modeling, and groundwater sampling along the eastern base boundary indicate that the offbase residents along Route 9 are not and should not be affected by contamination from FT-002.

Ecological resources in the WSA and Golf Course drainage systems (shown in Figure 3) are receiving groundwater, and contaminant loading, from the FT-002 site. A bioassessment of aquatic resources in the streams of these drainage basins was conducted during the RI/FS (URS 2001d) to evaluate potential impairment to the stream ecological communities. The study included sampling of benthic macroinvertebrates. Further analysis was performed and is presented in Section 7.2 of this IROD.

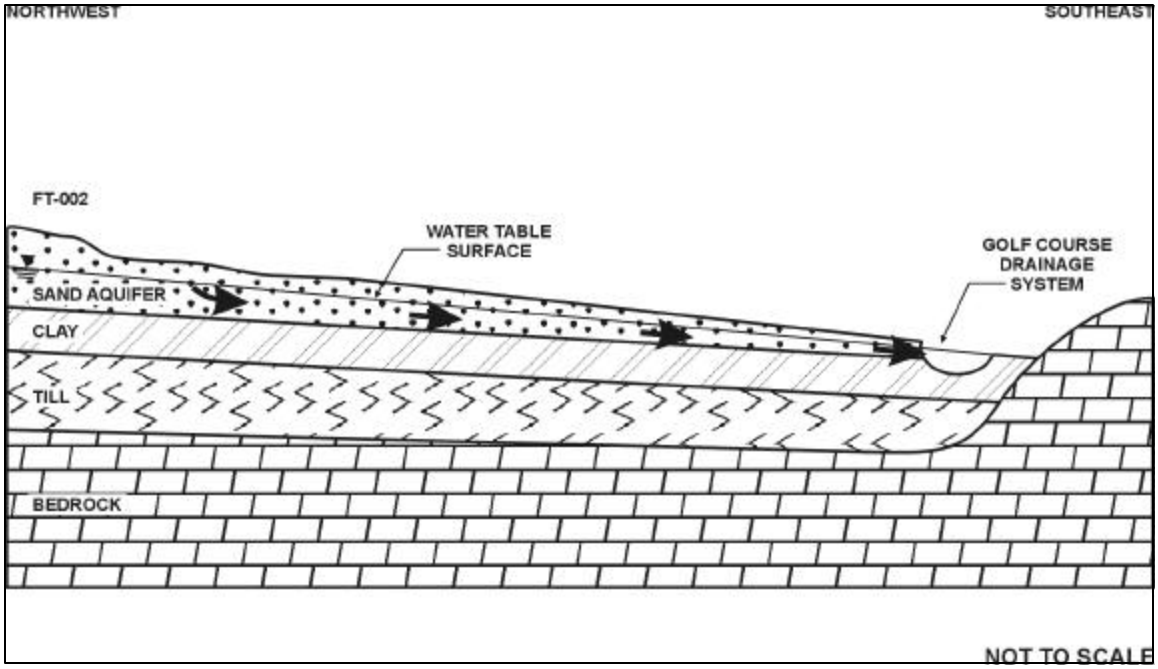


Figure 4 Conceptual Cross Section

5.3 Nature and Extent of Contamination in Groundwater

The chemical quality of groundwater in the vicinity of site FT-002, the flightline industrial corridor, and the former WSA was evaluated by compiling a database of existing groundwater analytical data (307 wells, 968 sample records) from studies/investigations conducted at Plattsburgh AFB during the period from 1987 to 1999. Contaminants detected in groundwater in the immediate vicinity of the FT-002 site included 17 VOCs, 14 semivolatile organic compounds (SVOCs), and 12 metals (Table 2). The metals generally were detected at or near background concentrations. VOCs included chlorinated hydrocarbons (e.g., trichloroethene), ketones (e.g., acetone), and fuel-related hydrocarbons (e.g., benzene). SVOCs included light fuel-related polycyclic aromatic hydrocarbons [PAHs] (e.g., naphthalene), heavier polycyclic aromatic hydrocarbons (e.g., phenanthrene), and phenolic compounds (e.g., 2-4 dimethyl phenol). Ketones, fuel-related polycyclic aromatic hydrocarbons, heavier polycyclic hydrocarbons, and phenolic compounds were not detected at concentrations above ARARs outside the source area and are not considered primary contaminants of concern for the FT-002/IA Groundwater OU. Only two groups of compounds, including chlorinated hydrocarbons (TCE, DCE, and vinyl chloride) and fuel-related volatiles (BTEX), were detected beyond the immediate source area at concentrations above ARARs. ARARs for these compounds are

TABLE 2

CHEMICALS DETECTED IN GROUNDWATER NEAR THE FT-002 SOURCE AREA

Volatile Organic Compounds	Semivolatile Organic Compounds	Metals
Methylene Chloride (20)	**Phenol (110)**	**Aluminum (3,610)**
Acetone (19)	2-Chlorophenol (130)	**Arsenic (20.6)**
Carbon Disulfide (280)	1,2-Dichlorobenzene (1,200)	**Calcium (112,000)**
1,1-Dichloroethene (DCE) (140)	2-Methylphenol (17)	**Chromium (143)**
1,2-DCE (total) (18,000)	**4-Methylphenol (140)**	**Iron (23,400)**
1,2-Dichloroethane (45)	**2,4-Dimethylphenol (98)**	Lead (126)
2-Butanone (690)	**Naphthalene (3,700)**	**Magnesium (45,900)**
Trichloroethene (TCE) (3,900)	4-Chloro-3-Methylphenol (42)	**Manganese (12,100)**
1,1,2-Trichloroethane (19)	**2-Methylnapthalene (9,600)**	Nickel (56.6)
Benzene (720)	Acenaphthene (780)	Potassium (7,470)
4-Methyl-2-Pentanone (70)	4-Nitrophenol (150)	**Sodium (43,500)**
2-Hexanone (96)	Pentachlorophenol (140)	Zinc (9,910)
Tetrachloroethene (52)	Phenanthrene (1,700)	
Toluene (4,200)	**bis(2-Ethylhexyl)phthalate (1,100)**	
Chlorobenzene (7)		
Ethylbenzene (1,400)		
Total Xylenes (13,000)		

BTEX = benzene, toluene, ethylbenzene, and total xylenes

(52) = Maximum concentration of contaminant detected in the source area during the RI (URS 1993) in micrograms per liter (µg/L). Note that concentrations at the well locations where the maximum detections occurred have generally diminished significantly since 1993.

Benzene = Chemicals shown in **bold** were detected in greater than 10% of the samples taken.

Primary Contaminants of Concern
1,2-Dichloroethene (DCE)
Trichloroethene (TCE)
Vinyl Chloride* (VC)
Benzene
Toluene
Ethylbenzene
Total Xylenes

* Vinyl Chloride is a degradation product of DCE and is detected downgradient from the FT-002 Source Area.

presented in Table 3. Chlorinated hydrocarbons and BTEX were detected at very high concentrations in the source area and these two groups of compounds are highly soluble and mobile in groundwater. Therefore, they are considered to be primary contaminants of concern. Contamination was found to be present only in the unconfined sand aquifer.

The extent of BTEX contamination is shown in Figure 5. The BTEX plume from FT-002 is about 4,000 feet long and 600 to 750 feet wide. This plume does not appear to be expanding, rather it appears to be at equilibrium (biological degradation is occurring as fast as the FT-002 source is feeding the plume). This accounts for the great difference in size between the BTEX plume and the larger chlorinated hydrocarbon plume (Figure 5). The biodegradation of the FT-002 BTEX plume was thoroughly investigated and documented by Parsons Engineering Science, Inc. and the USEPA National Risk Management Research Laboratory (formerly known as the Robert S. Kerr Laboratory) from 1993 through 1996 (Parsons 1995; 1997). Some of the BTEX compounds reach the deep drainage basin between the runway and flightline. These compounds travel via a large storm drain to the WSA drainage system. Benzene has been detected frequently in this drainage system, but at concentrations below surface water ARARs. In addition, a small area of BTEX groundwater contamination is located immediately south of Taxiway #3 at the former location of Pump House No. 3 (See Figure 2 and Section 2.4.6).

The extent of chlorinated hydrocarbon contamination at concentrations above groundwater ARARs is also shown in Figure 5. Although chlorinated hydrocarbons undergo biodegradation by a process known as reductive dechlorination, the biodegradation is slow and the plume of chlorinated hydrocarbons is still expanding. This biodegradation process changes TCE to DCE, DCE to vinyl chloride (VC), and VC to the non-toxic compound ethene over time. VC was detected at several locations away from the FT-002 source area. The plume of chlorinated hydrocarbons intersects the deep drainage basin between the runway and the flightline, and chlorinated hydrocarbons are discharging via the storm drain to the WSA drainage system. TCE is routinely detected at a concentration above its surface water ARAR (NYSDEC 1998) within a few hundred feet of the discharge location (Figure 5) before diluting to below its ARAR downstream. Some of the groundwater is not affected by the deep drainage basin and travels southward then southwestward around the deep drainage basin and discharges directly into the WSA drainage system.

TABLE 3

NEW YORK STATE GROUNDWATER ARARs

FOR PRIMARY CONTAMINANTS OF CONCERN

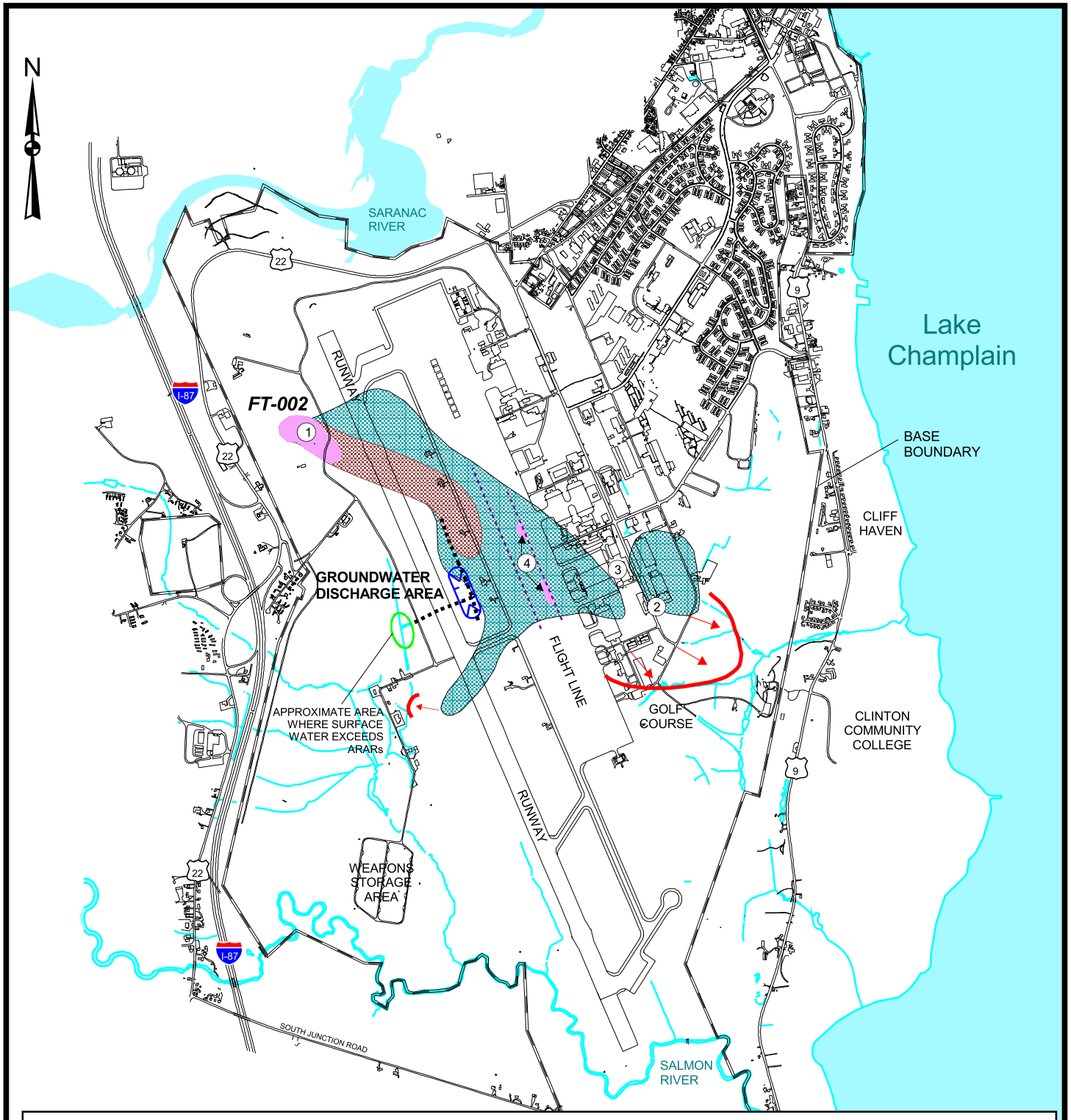
SUBSTANCE	MAXIMUM ALLOWABLE CONCENTRATION (µg/L)
Benzene	1
1,2-Dichloroethene	5
Ethylbenzene	5
Toluene	5
Trichloroethene	5
Vinyl Chloride	2
Xylene	5

Notes:

µg/L = microgram per liter

Reference: NYSDEC. 1998. "Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations." *Technical and Operational Guidance Series (1.1.1.)*. June. Albany, NY

Chlorinated hydrocarbons from the FT-002 site also are travelling underneath the flightline into the industrial corridor mingling with groundwater contamination upgradient from site SS-011, at site SD-041, at site SS-017, and from drains that formerly were located in the flightline. These other sources are shown in Figure 5. Sites SS-005 and SS-006 also were investigated as potential sources of groundwater contamination (URS 1998a and URS 1998b). These sites were determined not to be significant sources of groundwater contamination, although they lie on the northernmost limit of the FT-002 plume and chlorinated hydrocarbons have been intermittently detected in groundwater at the sites. Chlorinated hydrocarbons in groundwater in the industrial corridor eventually discharge to the Golf Course drainage system, although no chemicals attributable to this OU have been detected in this system above ARARs.



Legend

- Approximate Current Extent of Chlorinated Hydrocarbons in Groundwater (10 ug/L isopleth)
- Approximate Current Extent of BTEX in Groundwater (10 ug/L isopleth)
- Major Storm Drain
- Predicted Future Migration of Chlorinated Hydrocarbons if no action taken. Approximate Maximum Extent Shown

Significant Sources of Groundwater Contamination for the FT-002 Groundwater OU

1. FT-002
2. SD-041
3. SS-017
4. SS-004 - Potential Drainage Trench Sources

2500 0 2500 Feet

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PREDICTED FUTURE MIGRATION OF GROUNDWATER CONTAMINATION IF NO ACTION TAKEN

FIGURE 5

J:\0100013\DB\GIS\1999\wgoperunit.apr BTEX PLUMES
3/28/2002

5.4 Future Migration of Contamination in Groundwater

A numerical contaminant transport model was developed as part of the RI/FS (URS 2000d) to evaluate the fate of chlorinated hydrocarbons in groundwater and to predict their future potential impact on receiving surface water bodies. The transport model was built upon a groundwater flow model developed to provide a mathematical representation of the groundwater flow regime at Plattsburgh AFB. The program MODFLOW was used. The flow model was calibrated to a basewide groundwater flow map developed from measurements of groundwater levels at over 300 wells and piezometers. The transport model was calibrated to the existing pattern of contamination determined using the extensive database of chemical data.

The modelling predicts that the extent of the chlorinated hydrocarbon plume will expand in the industrial corridor and toward the WSA drainage system as shown in Figure 5, if no remedial action is taken. About 90% of the mass of contamination is heading toward the WSA drainage system with the remainder heading toward the Golf Course drainage system. The chlorinated hydrocarbon plume is predicted to reach its maximum extent in about 30 years if no remedial action is taken. Loading to the WSA drainage system is expected to remain at its current level or decrease slightly in the future, whereas loading to the Golf Course drainage system is expected to increase in the future (but to levels one order of magnitude less than the loading to the WSA drainage system), if no action is taken.

6.0 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

PARC is responsible for maintaining base property, marketing and controlling base reuse, leasing and managing property, and developing base facilities, as necessary, to promote advantageous reuse. According to land use plans (PARC 1995), the identified use of FT-002, its surrounding area, and the base's industrial corridor is commercial/industrial and aviation support. To the east of the industrial corridor, downgradient from FT-002, the identified use is recreational – the area is currently in use as a golf course (the Barracks Golf Course). The base land use plans developed by PARC were incorporated into the USAF's Environmental Impact Statement (Tetra Tech 1995). Currently, groundwater in the affected aquifer at the site is not being utilized as a resource. New York State considers all groundwater (Class GA) in the State as having the potential for use as a future potable resource.

7.0 SUMMARY OF SITE RISKS

Baseline risk assessments pertaining to groundwater or surface water were conducted as part of RIs undertaken at sites FT-002, SS-005, SS-006, and SS-017. These assessments estimated the risks associated with current and potential future planned industrial and hypothetical residential land use conditions. A baseline risk assessment estimates the human health and ecological risk which could result from the contamination at the site if no remedial action was taken.

7.1 Human Health Risk Assessments (HRAs)

A four-step process is utilized for assessing site-related human health risks for a reasonable maximum exposure scenario: *Hazard Identification* – identifies the contaminants of concern at the site based on several factors such as toxicity, frequency of occurrence, and concentration. *Exposure Assessment* – estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingesting contaminated well water) by which humans are potentially exposed. *Toxicity Assessment* – determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response). *Risk Characterization* – summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks.

The HRAs for the several sites evaluated potential human exposure to contaminants by ingestion of contaminated groundwater, skin contact with contaminated groundwater, and inhalation of vapors produced by contaminated groundwater and surface water. Risks were quantified and compared to USEPA evaluation criteria. Under USEPA guidelines, a calculated cancer risk of less than 1×10^{-6} is acceptable and risks in the range of 1×10^{-4} to 1×10^{-6} are evaluated on a case-by-case basis. A potential noncancer risk is indicated if the hazard index exceeds 1. Criteria (10^{-4} for cancer and 1 for noncancer) were exceeded for the following:

- Ingestion of contaminated groundwater extracted from the FT-002 plume or the SS-017 site

- Inhalation of vapors while showering using groundwater extracted from the FT-002 plume

- Skin contact with contaminated groundwater by a child resident at site SS-017

It should be noted that all the above exposure pathways are hypothetical. Groundwater is not currently used as a potable supply source in the impacted areas, and the impacted areas currently are not used for residential purposes and are not expected to be used for residential purposes in the future under the reuse and redevelopment plan for the base (Tetra Tech 1995).

The HRAs indicate that there will be no significant human health risk if groundwater is not used as a potable supply source or if contaminants in groundwater are reduced to levels acceptable for use as drinking water.

7.2 Ecological Risk Assessments (ERAs)

A four-step process is utilized for assessing site-related ecological risks for a reasonable maximum exposure scenario: *Problem Formulation* – a qualitative evaluation of contaminant release, migration, and fate; identification of contaminants of concern, receptors, exposure pathways, and known ecological effects of the contaminants; and selection of endpoints for further study. *Exposure Assessment* - a quantitative evaluation of contaminant release, migration, and fate; characterization of exposure pathways and receptors; and measurement or estimation of exposure point concentrations. *Ecological Effects Assessment* – literature reviews, field studies, and toxicity tests linking contaminant concentrations to effects on ecological receptors. *Risk Characterization* - measurement or estimation of current adverse effects.

The ERAs for the several sites (FT-002, SS-004, SS-005, SS-006, and SS-017) evaluated potential exposure of terrestrial and aquatic species to contaminated surface water and sediments. Significant findings of the ERAs are summarized below.

- A potential risk to fish species such as rainbow trout in a portion of the WSA drainage system was identified (note the portion of the WSA stream above ARARs in Figure 5). The contaminant of concern is TCE.

- At sites SS-005, SS-006, and SS-017, concentrations in groundwater exceeded guidelines for surface water for some chemicals of concern. However, the actual risk is expected to be much smaller than indicated, since groundwater concentrations would be reduced greatly in surface water by mixing and volatilization.

In summary, the ERAs indicate that there is no significant risk to aquatic or terrestrial species from sites in the FT-002/IA Groundwater OU except for a potential risk to fish species such as rainbow trout in a portion of the WSA stream.

8.0 REMEDIAL ACTION OBJECTIVES

The remedial objectives for the FT-002/IA Groundwater OU are: 1) to prevent ingestion of groundwater containing contaminant concentrations above ARARs; 2) to restore groundwater to ARARs; 3) to prevent migration of groundwater with contaminant concentrations above ARARs beyond base boundaries; and 4) to prevent further impact to surface water that has been impacted by contaminated groundwater.

9.0 DESCRIPTION OF THE ALTERNATIVES

Sixteen alternatives were developed and evaluated in the RI/FS to address interim remedial objectives for the FT-002/IA Groundwater OU. Fifteen alternatives were developed during the Draft-Final version of the RI/FS (URS 2000a). Following discussions between USAF, NYSDEC, and USEPA, a sixteenth alternative (Alternative 13) was added for comparative analysis in the Final RI/FS (URS 2001d).

Remediation goals are chemical- specific targets for remediation that are developed consistent with the remedial objectives. For the FT-002/IA Groundwater OU, remediation goals for groundwater are ARARs which include federal maximum contaminant levels (MCLs) or New York State groundwater quality standards, whichever are most stringent. Remediation goals for the contaminants of concern (TCE, DCE, VC, and BTEX) are presented in Table 4. Remediation goals for surface water are NYSDEC surface water quality standards for the Golf Course and WSA drainage systems, which are classified as Class D under the New York Code of Rules and Regulations (6 NYCRR Parts 700 to 705). Remediation goals for primary contaminants of concern in surface water also are presented in Table 4.

For clarification, it should be noted that remedial objective 4 will not be achieved by actively or directly treating surface water. Rather this objective will be addressed by collecting and treating groundwater that is currently impacting the WSA stream. Groundwater collection and treatment technologies that achieve the remedial objectives are discussed in the next section.

Alternatives developed are described in greater detail below. The alternatives have been evaluated considering the actions implemented under the soil or source OUs of sites within the area impacted by contaminated groundwater. Since hydraulic containment of the source has been specified as one element of the interim remedy for the FT-002 Source OU, it is assumed that the major source for further groundwater contamination will be controlled in the future.

It should be noted that the estimates of cleanup time frames and the mass of contaminants treated for the alternatives presented below are based on the groundwater transport model and are imprecise. That is, the estimates are based on the projections of the model several decades into the future so results cannot be regarded with absolute certainty. The accuracy of the estimates,

TABLE 4

GROUNDWATER AND SURFACE WATER REMEDIATION GOALS

Compound	Groundwater (µg/L)	Surface Water (µg/L)
VC	2	NV
DCE	5	NV
TCE	5	40
Benzene	1	10
Toluene	5	6,000
Ethylbenzene	5	NV
Xylene (total)	5	NV

Note:

NV = No value; there are no Class D surface water standards for these compounds.

however, meets the goals of the USEPA RI/FS guidance with respect to evaluating long-term and short-term effectiveness reduction of the toxicity, mobility, and volume of the principle threat waste, and cost for all alternatives.

Alternative 1:

NO ACTION

Capital Cost: $0

Present Worth O&M: $0

Total Present Worth: $0

Years to Groundwater ARARs: 190

Years to Surface Water ARARs: 45

The Superfund program requires that the "No Action" alternative be evaluated at every site to establish a baseline for comparison. Under this alternative, Plattsburgh AFB would take no further action to prevent exposure to the contaminated groundwater.

Alternative 2:

MONITORED NATURAL ATTENUATION

Capital Cost: $2.5 million

Present Worth O&M: $0.9 million

Total Present Worth: $3.4 million

Years to Groundwater ARARs: 190

Years to Surface Water ARARs: 45

Alternative 2 relies on natural processes to mitigate contamination. Under this alternative, the plume should expand somewhat, but will not migrate off base at concentrations above ARARs. Modeling predicts that nearly all contamination will be discharged to drainage streams where it will attenuate (primarily by volatilization) well before reaching the base boundaries. This alternative includes deed restrictions prohibiting the installation of wells for drinking water or any other purpose which could result in the use of the underlying groundwater, effectively preventing human ingestion of contaminated groundwater. Other deed restrictions include prohibition of discharge of groundwater withdrawn during construction dewatering and prohibition of development or land use which interferes with remedial operations. Wells installed along the eastern base boundary also will be used to provide warning if contaminated groundwater migrates toward residential groundwater wells located east of the base. Surface water sampling will be performed to assess contaminant levels in drainage streams and determine if offbase water bodies are being adversely effected.

Alternative 2 also includes provisions for implementing contingency measures in the event that monitoring results show potential impact on downgradient receptors. Extension of the existing water line along Route 9 would be the most likely action if groundwater contamination could impact residences along Route 9. Surface water collection and treatment would be the most likely action if surface water sampling shows that contaminants could impact offbase water bodies.

The alternative also includes site reviews every five years in accordance with Section 121(c) of CERCLA to ensure that human health and the environment are protected.

Alternative 3:

COLLECTION/TREATMENT BETWEEN RUNWAY AND FLIGHTLINE

Capital Cost: $2.3 million

Present Worth O&M: $2.3 million

Total Present Worth: $4.6 million

Years to Groundwater ARARs: 120

Years to Surface Water ARARs: 0

Alternative 3 includes the installation of a collection trench, sloped to allow groundwater flow by gravity, beneath the deep drainage basin between the runway and flightline. Groundwater captured by the trench would be treated in a treatment system, currently envisioned to be a constructed aeration basin, before being discharged to the WSA drainage system. This system would treat contaminant discharge to the WSA drainage to levels less than appropriate NYSDEC criteria, thereby achieving surface water ARARs in the drainage upon startup of the treatment. The locations of these features are shown in blue in Figure 6. Approximately 7,600 pounds of contamination would be treated by this system in the first 10 years of operation. This constitutes a great majority of the estimated contamination that is attributable to the FT-002 site. Treatment of water discharged to the WSA drainage system and air emitted from the treatment basin would be in accordance with appropriate criteria established by the NYSDEC regulations. Alternative 3 also includes groundwater deed restrictions, groundwater and surface water monitoring, and five-year site reviews described under Alternative 2.

Alternative 4a:

COLLECTION/TREATMENT BETWEEN RUNWAY AND FLIGHTLINE AND EAST FLIGHTLINE COLLECTION TRENCH

Capital Cost: $3.7 million

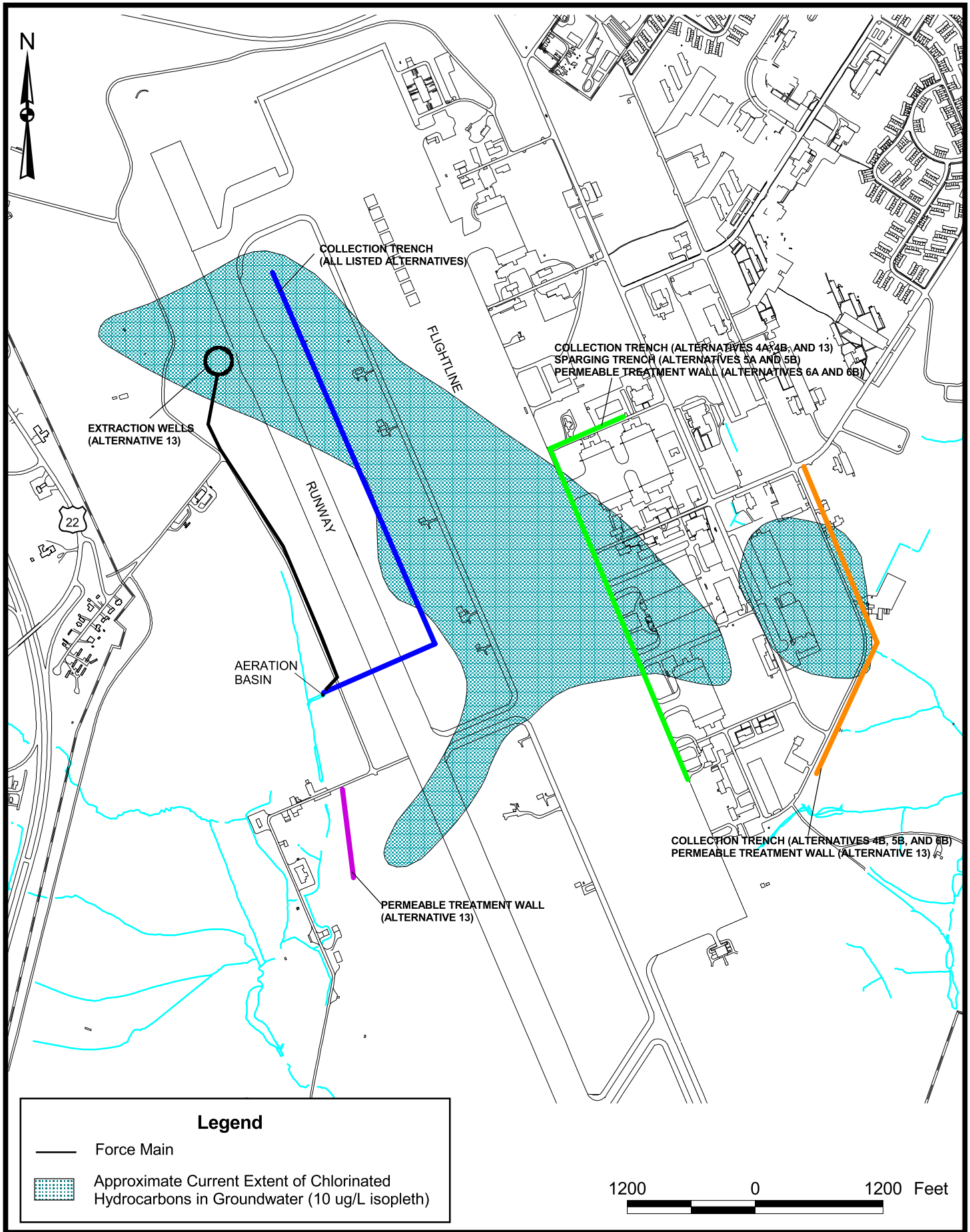
Present Worth O&M: $2.6 million

Total Present Worth: $6.3 million

Years to Groundwater ARARs: 100

Years to Surface Water ARARs: 0

Alternative 4a includes the collection trench and treatment between the runway and flightline described under Alternative 3, and the groundwater deed restrictions, groundwater and



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LOCATION OF TREATMENT COMPONENTS FOR ALTERNATIVES 3, 4, 5, 6, AND 13

FIGURE 6

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surface water monitoring, and five-year site reviews described under Alternative 2. In addition, a second collection trench would be constructed along the eastern edge of the flightline, as shown in green in Figure 6. The additional trench would collect contaminated groundwater that has passed beyond the influence of the runway/flightline trench and is traveling toward the industrial corridor. The industrial corridor of the base is considered a valuable asset by the community because of its potential for redevelopment. More rapid cleanup of contamination in this area is advantageous because it would diminish concerns regarding groundwater handling during construction. The water collected by the east flightline collection trench would be discharged to the Golf Course drainage system in a manner consistent with NYSDEC regulations. Approximately 7,600 pounds of contamination would be treated by the systems specified under this alternative in the first 10 years of operation.

Alternative 4b:

COLLECTION/TREATMENT BETWEEN RUNWAY AND FLIGHTLINE, EAST FLIGHTLINE COLLECTION TRENCH, AND IDAHO AVENUE COLLECTION TRENCH

Capital Cost: $4.7 million

Present Worth O&M: $2.9 million

Total Present Worth: $7.6 million

Years to Groundwater ARARs: 80

Years to Surface Water ARARs: 0

Alternative 4b includes the collection trench and treatment between the runway and flightline described in Alternative 3, the collection trench along the eastern edge of the flightline described under Alternative 4a, and the groundwater deed restrictions, groundwater and surface water monitoring, and five-year site reviews described under Alternative 2. In addition, a third collection trench would be constructed along Idaho Avenue, as shown in orange in Figure 6. This third trench would collect contaminated groundwater already within the industrial corridor as a result of the FT-002 site and other sources within the corridor, thereby limiting the extent of contamination to the area west of Idaho Avenue. The water collected by the Idaho Avenue collection trench would be discharged to the Golf Course drainage system in a manner consistent

with NYSDEC regulations. Approximately 7,600 pounds of contamination would be treated by the systems specified under this alternative in the first 10 years of operation.

Alternative 5a

COLLECTION/TREATMENT BETWEEN RUNWAY AND FLIGHTLINE AND EAST FLIGHTLINE SPARGING

Capital Cost: $4.7 million

Present Worth O&M: $21.3 million

Total Present Worth: $26.0 million

Years to Groundwater ARARs: 100

Years to Surface Water ARARs: 0

Alternative 5a includes the collection trench and treatment between the runway and flightline described under Alternative 3 and the groundwater deed restrictions, groundwater and surface water monitoring, and five-year site reviews described under Alternative 2. In addition, an air sparging trench would be constructed along the eastern edge of the flightline, at the location shown in green on Figure 6. Air sparging is the injection of air into the saturated zone below or within the zone of contamination. In this instance, the air would be injected into the aquifer using a horizontal pipe at the bottom of the trench. Contaminants are entrained in the air and discharged to the atmosphere at the surface. Approximately 7,600 pounds of contamination would be treated by the systems specified under this alternative in the first 10 years of operation.

Alternative 5b

COLLECTION/TREATMENT BETWEEN RUNWAY AND FLIGHTLINE, EAST FLIGHTLINE SPARGING, AND IDAHO AVENUE COLLECTION TRENCH

Capital Cost: $5.8 million

Present Worth O&M: $21.4 million

Total Present Worth: $27.2 million

Years to Groundwater ARARs: 80

Years to Surface Water ARARs: 0

Alternative 5b includes the collection trench and treatment between the runway and flightline described under Alternative 3, the groundwater deed restrictions, groundwater and

surface water monitoring, and five-year site reviews described under Alternative 2, and the air sparging trench along the eastern edge of the flightline described under Alternative 5a. In addition, a collection trench would be constructed along Idaho Avenue (described under Alternative 4b). Approximately 7,600 pounds of contamination would be treated by the systems specified under this alternative in the first 10 years of operation.

Alternative 6a

COLLECTION/TREATMENT BETWEEN RUNWAY AND FLIGHTLINE AND EAST FLIGHTLINE PERMEABLE TREATMENT WALL

Capital Cost: $10.5 million

Present Worth O&M: $5.7 million

Total Present Worth: $16.2 million

Years to Groundwater ARARs: 100

Years to Surface Water ARARs: 0

Alternative 6a includes the collection trench and treatment between the runway and flightline described under Alternative 3 and the groundwater deed restrictions, groundwater and surface water monitoring, and five-year site reviews described under Alternative 2. In addition, a permeable treatment wall would be constructed along the eastern edge of the flightline, at the location shown in green on Figure 6. Using this technology, contaminated groundwater upgradient from (to the west of) the wall would be cleaned up by a chemical reaction with reactive media emplaced within the wall, as it passes through to the east. Approximately 7,600 pounds of contamination would be treated by the system specified under this alternative in the first 10 years of operation.

Alternative 6b

COLLECTION/TREATMENT BETWEEN RUNWAY AND FLIGHTLINE, EAST FLIGHTLINE PERMEABLE TREATMENT WALL AND IDAHO AVENUE COLLECTION TRENCH

Capital Cost: $11.6 million

Present Worth O&M: $5.9 million

Total Present Worth: $17.5 million

Years to Groundwater ARARs: 80

Years to Surface Water ARARs: 0

Alternative 6b includes the collection trench and treatment between the runway and flightline as described in Alternative 3, the groundwater deed restrictions, groundwater and surface water monitoring, and five-year site reviews as described under Alternative 2, and the permeable treatment wall along the eastern edge of the flightline described under Alternative 6a. In addition, a collection trench would be constructed along Idaho Avenue (as described in Alternative 4b). Approximately 7,600 pounds of contamination would be treated by the systems specified under this alternative in the first 10 years of operation.

Alternative 7

CONTAINMENT OF PLUME CORE

Capital Cost: $5.6 million

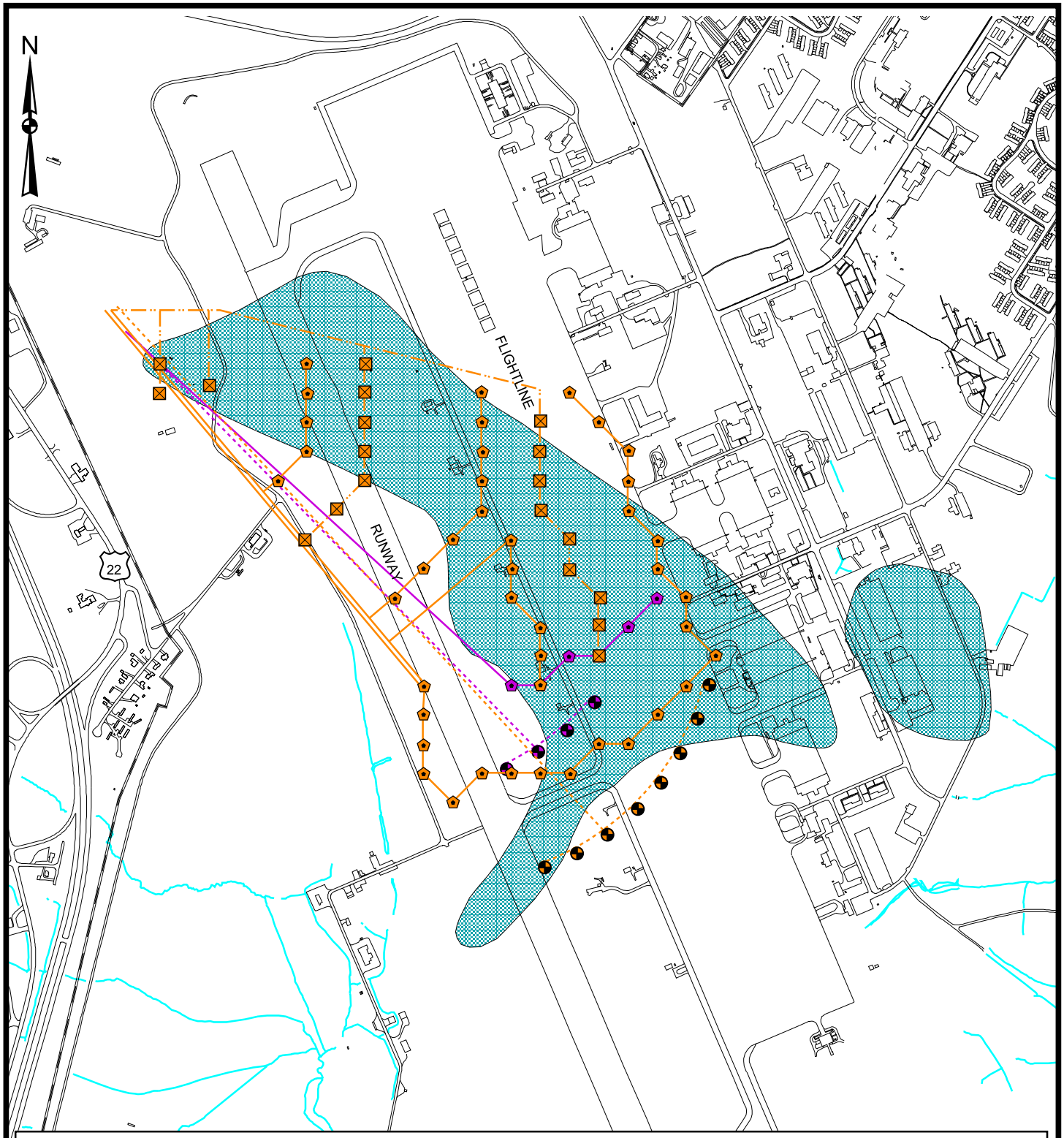
Present Worth O&M: $10.3 million

Total Present Worth: $15.9 million

Years to Groundwater ARARs: 170

Years to Surface Water ARARs: 25

Alternative 7 includes installing groundwater extraction wells at the downgradient edge of the most highly contaminated groundwater (i.e., the plume core, which is defined as the area where the total concentration of dissolved chlorinated hydrocarbons exceeds 1,000 µg/L) to prevent its further migration. Extracted groundwater would be treated by a newly constructed water treatment plant and discharged to an infiltration gallery downgradient from the extraction zone. Major components of this system are shown in purple in Figure 7. The system would be operated until groundwater ARARs were achieved in the plume core. This alternative also



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URS Consultants, Inc.	LOCATION OF TREATMENT COMPONENTS FOR ALTERNATIVES 7, 8, AND 9	FIGURE 7

includes the groundwater deed restrictions, groundwater and surface water monitoring, and five-year site reviews described under Alternative 2. Approximately 900 pounds of contamination would be treated by the systems specified under this alternative in the first 10 years of operation.

Alternative 8

CONTAINMENT OF PLUME CORE – ALTERNATE CLEANUP LEVELS

Capital Cost: $5.6 million

Present Worth O&M: $10.0 million

Total Present Worth: $15.6 million

Years to Groundwater ARARs: 170

Years to Surface Water ARARs: 25

Like Alternative 7, Alternative 8 includes extraction of groundwater from the downgradient edge of the plume core, with reinjection downgradient following treatment, and the groundwater deed restrictions, groundwater and surface water monitoring, and five-year site reviews described under Alternative 2. However, Alternatives 7 and 8 differ in the period of operation of the extraction, treatment, and reinjection system. Rather than cleaning up the plume core to ARARs as in Alternative 7, the treatment operations for Alternative 8 would be discontinued when chlorinated hydrocarbon concentration reached 250 µg/L or less. This is a concentration approximating a potential cancer risk at the upper limit (10^{-4}) of the target risk range (10^{-4} to 10^{-6}) considered acceptable to USEPA on a case-by-case basis. Approximately 900 pounds of contamination would be treated by the systems specified under this alternative in the first 10 years of operation.

Alternative 9

ACCELERATED RESTORATION OF ENTIRE PLUME

Capital Cost: $15.6 million

Present Worth O&M: $38.4 million

Total Present Worth: $54.0 million

Years to Groundwater ARARs: 60

Years to Surface Water ARARs: 0

Alternative 9 includes the installation of extraction wells at the downgradient edge of the plume and within the plume, and the installation of reinjection wells within the plume. Extracted

water would be treated at a newly-constructed water treatment plant and the treated water reinjected. This recirculation (extraction /cleaning/reinjecting) process would occur at a high rate to reduce the restoration time frame. Approximately 1,200 gallons per minute (gpm) of contaminated groundwater would be extracted with 900 gpm reinjected within the plume and 300 gpm discharged to an infiltration gallery downgradient of the extraction zone. System components are depicted in orange in Figure 7. This alternative also includes the groundwater deed restrictions, groundwater and surface water monitoring, and five-year site reviews described under Alternative 2. Approximately 8,800 pounds of contamination would be treated by the systems specified under this alternative in the first 10 years of operation.

Alternative 10

ACCELERATED RESTORATION OF PLUME CORE

Capital Cost: $8.1 million

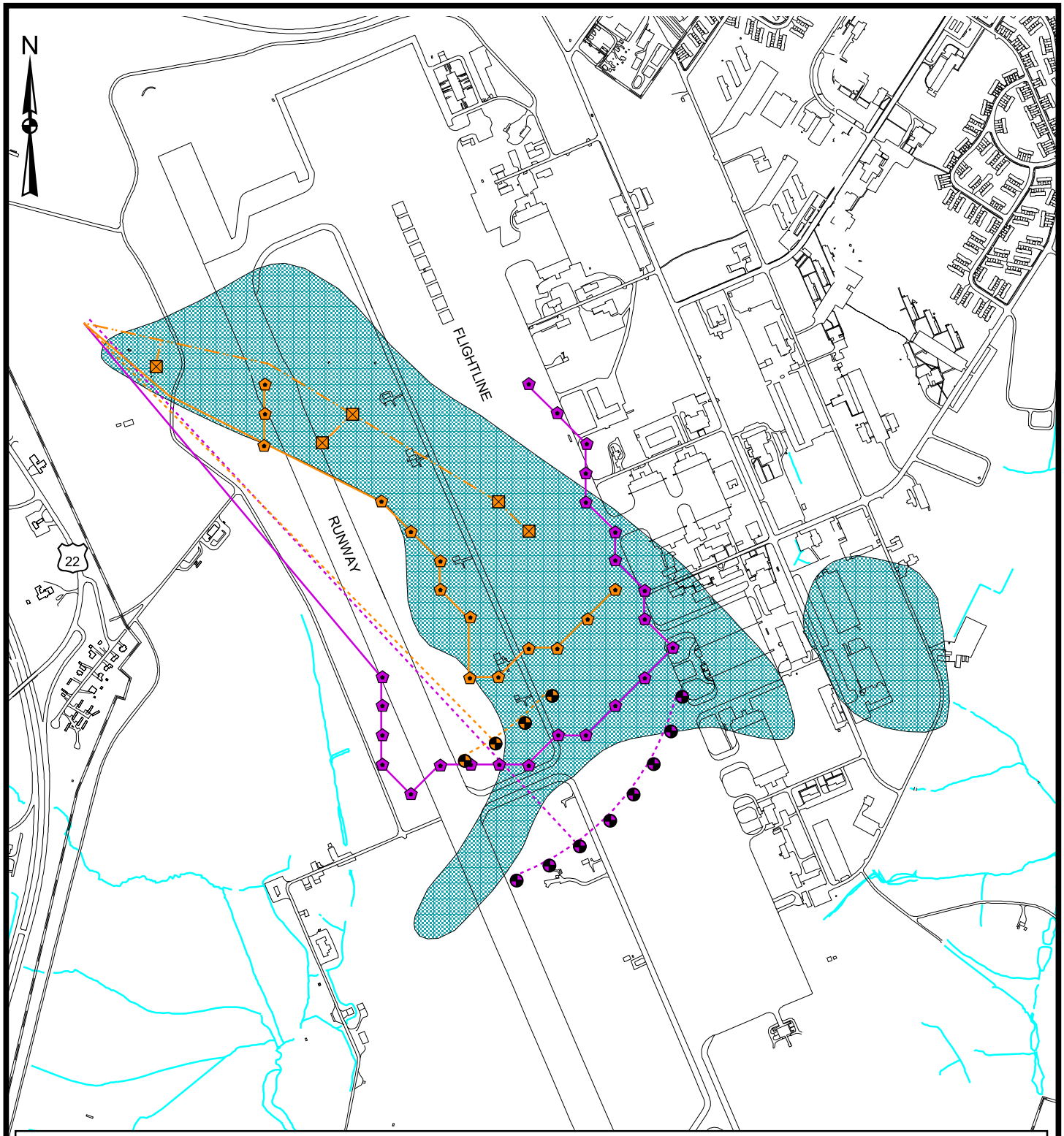
Present Worth O&M: $18.1 million

Total Present Worth: $26.2 million

Years to Groundwater ARARs: 140

Years to Surface Water ARARs: 0

Alternative 10 is similar to Alternative 9 in the application of a groundwater recirculation process (extraction/cleaning/reinjecting) to reduce the restoration time frame. These alternatives differ in the location where the pumping and reinjection are applied. Unlike Alternative 9 which applies groundwater recirculation of the entire plume, Alternative 10 focuses the recirculation only on the plume core. The system would be operated until groundwater ARARs are achieved within the plume core. Groundwater would be extracted at a rate of about 450 gpm from within the plume core of which about half would be reinjected within the plume core and half discharged to an infiltration gallery downgradient of the extraction zone. System components are depicted in orange in Figure 8. This alternative also includes the groundwater deed restrictions, groundwater and surface water monitoring and five-year site review described under Alternative 2. Approximately 7,500 pounds of contamination would be treated by the systems specified under this alternative in the first 10 years of operation.



Legend

- Extraction Well
- Infiltration Gallery
- Reinjection Well
- Force Main
- Force Main for Infiltration Gallery
- Force Main for Reinjection Well
- Alternative 12 Components
- Alternative 10 and 11 Components
- Approximate Extent of Chlorinated Hydrocarbons in Groundwater (10 ug/L isopleth)

1200 0 1200 Feet

URS Consultants, Inc.	LOCATION OF TREATMENT COMPONENTS FOR ALTERNATIVES 10, 11, AND 12	FIGURE 8

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Alternative 11

ACCELERATED RESTORATION OF PLUME CORE ALTERNATE CLEANUP LEVELS

Capital Cost: $8.0 million

Present Worth O&M: $16.5 million

Total Present Worth: $24.5 million

Years to Groundwater ARARs: 140

Years to Surface Water ARARs: 0

Like Alternative 10, Alternative 11 includes groundwater recirculation (extraction/cleaning/reinjecting) focused on the plume core and the groundwater deed restrictions, groundwater and surface water monitoring, and five-year site reviews described under Alternative 2. However, Alternatives 10 and 11 differ in the period of operation of the recirculation system. Rather than cleaning up the plume core to ARARs as in Alternative 10, the recirculation operations for Alternative 11 would be discontinued when chlorinated hydrocarbon concentrations reached 250 µg/L or less. This is a concentration approximating a potential cancer risk at the upper limit (10^{-4}) of the target risk range (10^{-4} to 10^{-6}) considered acceptable to USEPA on a case-by-case basis. Approximately 7,500 pounds of contamination would be treated by the systems specified under this alternative in the first 10 years of operation.

Alternative 12

CONTAINMENT OF ENTIRE PLUME

Capital Cost: $8.0 million

Present Worth O&M: $15.8 million

Total Present Worth: $23.8 million

Years to Groundwater ARARs: 120

Years to Surface Water ARARs: 25

Alternative 12 is similar to Alternative 7 in the application of pumping on the downgradient edge of the plume and reinjection via an infiltration gallery downgradient from the extraction zone. These alternatives differ in the location where the pumping is applied. Unlike Alternative 7 which focuses groundwater pumping on the downgradient edge of the plume core, Alternative 12 applies groundwater pumping on the downgradient edge of the entire plume. System components are shown in purple on Figure 8. This alternative also includes the

groundwater deed restrictions, groundwater and surface water monitoring, and five-year site reviews described under Alternative 2. Approximately 600 pounds of contamination would be treated by the systems specified under this alternative in the first 10 years of operation.

Alternative 13

COLLECTION/TREATMENT BETWEEN RUNWAY AND FLIGHTLINE, EAST FLIGHTLINE COLLECTION TRENCH, IDAHO AVENUE PERMEABLE TREATMENT WALL, WSA TREATMENT WALL, AND PUMPING OF CORE

Capital Cost: $9.5 million

Present Worth O&M: $6.2 million

Total Present Worth: $15.7 million

Years to Groundwater ARARs: 80

Years to Surface Water ARARs: 0

Alternative 13 includes the collection trench and treatment between the runway and flightline described in Alternative 3, the collection trench along the eastern edge of the flightline described under Alternative 4a, and the groundwater deed restrictions, groundwater and surface water monitoring, and five-year site reviews described under Alternative 2. In this alternative, the aeration basin would be covered to enable treatment of contaminants in the air stripped from the water in the basin.

In addition, a permeable treatment wall would be constructed along Idaho Avenue, at the location shown in orange on Figure 6. A permeable treatment wall also would be constructed immediately upgradient from the WSA drainage system, at the location shown in purple in Figure 6. Further, groundwater from the westernmost portion of the plume core (the core is the area where the total concentration of chlorinated hydrocarbons exceeds 1,000 µg/L) would be pumped from withdrawal wells located between the FT-002 site and the runway (as shown in Figure 6).

The WSA permeable treatment wall would be constructed to intercept groundwater contamination that flows around the collection trench to be located between the runway and flightline. If the permeable treatment wall was not constructed, contaminated (untreated) groundwater may be discharged to the WSA drainage system. Groundwater recovered from the pumping wells, targeted to recover as much contaminant mass as possible to the bottom of the

aquifer, would be discharged via a drain line to a treatment system, currently envisioned to be a covered aeration basin, where it would be treated with the water recovered from the flightline/ runway trench. Approximately 8,000 pounds of contamination would be treated by the systems specified under this alternative in the first 10 years of operation.

10.0 SUMMARY OF COMPARATIVE ANALYSIS

The alternatives for the FT-002 Groundwater OU were analyzed with respect to nine criteria specified in the National Contingency Plan, which directs remediation of inactive hazardous waste sites. A brief description of each criterion and the evaluation of alternatives based on these criteria are presented below. The USEPA has categorized the evaluation criteria into three principal groups:

Threshold Criteria - The recommended alternative must meet these requirements.

- Overall protection of human health and the environment.
- Compliance with ARARs

Primary Balancing Criteria - The most favorable and cost-effective alternative is determined using these criteria (a remedy is cost effective if its costs are proportional to its overall effectiveness).

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume
- Short-term effectiveness
- Implementability
- Cost

Modifying Criteria - The recommended alternative may be modified by public input before it is finalized and presented in the IROD.

- State Acceptance
- Community Acceptance

Analysis

A detailed discussion and comparative analysis is contained in the FS. This analysis is summarized below.

- **Overall Protection of Human Health and the Environment** addresses whether a remedy provides adequate protection to potential human and ecological receptors.

All alternatives, except Alternative 1 (No Action), are protective of human health and the environment.

- **Compliance with ARARs** addresses whether a remedy will meet all of the ARARs of federal and state environmental statutes, and/or provide grounds for invoking a waiver.

The time to reach chemical-specific groundwater ARARs is estimated to range from 60 to 190 years for the various alternatives. Alternative 9 (60 years) and Alternatives 4b, 5b, 6b, and 13 (80 years) would achieve groundwater ARARs in the shortest amount of time, whereas Alternatives 7 and 8 (170 years) and 1 and 2 (190 years) would achieve ARARs in longer periods of time.

The time to reach surface water ARARs is estimated to range from 0 (i.e., shortly after remediation is in place) to 45 years for the various alternatives. Alternatives other than 7, 8, and 12 (25 years) and 1 and 2 (45 years) would achieve surface water ARARs upon implementation (0 years).

Work in or impacts to State regulated wetlands or protected streams must meet the substantive requirements of 6NYCRR Part 663 Freshwater Wetlands Permit Requirements (including the Guidelines on Compensatory Mitigation) and 6 NYCRR Part 608 Use and Protection of Waters. The alternatives specifying groundwater collection (Alternatives 3, 4, 7, 8, 9, 10, 11, 12, and 13) will require a greater effort to meet these requirements compared to those that specify more passive remedial measures (1, 2, 5, and 6).

- **Long-Term Effectiveness and Permanence** refers to the magnitude of residual risk, and the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

Groundwater monitoring, institutional controls, and surface water sampling will need to continue until ARARs are achieved. Interim institutional controls are specified by this IROD. Final institutional controls and how they are to be implemented will be addressed in the final ROD. In this way, long-term effectiveness is related to the ability of the alternative to achieve ARARs (see discussion of ARAR compliance above). As ARARs are achieved more quickly, encumbrances on property and associated potential devaluation of property also would be eliminated sooner.

- **Reduction of Toxicity, Mobility, or Volume** addresses the anticipated performance of treatment technologies employed in the remedy.

The reduction of toxicity, mobility, or volume (TMV) between the alternatives can be compared by examining the mass of contamination treated for each alternative as summarized below:

	Mass Treated (pounds)	
Alt.	**10 Years**	**Overall**
1, 2	0	0
3 – 6	7,600	8,000
7 – 8	900	4,700
9	8,800	8,800
10 – 11	7,500	8,700
12	600	5,000
13	8,000	8,200

As shown, the alternatives with the best overall reduction of TMV are 9, 10, and 11, whereas the alternatives with the best reduction of TMV in the first 10 years of operation are 9 and 13. Alternatives 1 and 2 do not provide for reduction of TMV and Alternatives 7, 8, and 12 provide a level of reduction of TMV that is significantly less than the other alternatives. As discussed in Section 9.0, the estimate presented in the table above are imprecise, although they meet the goals of USEPA guidance with respect to evaluating TMV.

- **Short-Term Effectiveness** refers to the speed with which the alternative achieves protection, as well as the alternative's potential to create adverse impacts on human health or the environment during its implementation.

All alternatives, except 1 (No Action), achieve protection immediately since interim groundwater use restrictions are in place. This IROD includes interim institutional controls needed to minimize the exposure of any future users of property encompassed by the FT-002/IA Groundwater OU including USAF personnel, lessees/sublessees, transferees, and construction workers, as well as the environment, to hazardous substances. In addition, these interim controls are needed to maintain the integrity of the interim remedial action until the final remedy is selected and the remedial action is complete. Final institutional controls and how they are to be implemented will be addressed in the final ROD. All alternatives (except Alternative 1) include intrusive activities that could produce air emissions potentially impacting workers or the community. The greatest intrusive activities are associated with trench technologies (3, 4, 5, 6, and 13). The least intrusive activities are associated with Alternative 2. In all cases, potential short-term risk easily can be controlled or minimized by implementing standard environmental health and safety measures.

- **Implementability** addresses aspects of implementing the remedial alternatives, such as the ability to construct and operate technologies, reliability, ability to monitor effectiveness, availability of materials and services, permitting, and coordination with other agencies.

A comparison of alternatives in terms of implementability is presented below.

Alternative 1 (No Action) requires no action and is easily implemented.

All alternatives, other than Alternative 1, include institutional controls and long term monitoring, which would entail a similar level of effort to implement. Monitoring is a frequent requirement for remedial actions and is easy to implement. Institutional controls can be implemented through property transfer documents but also require follow-up to ensure that restrictions are implemented and enforced.

Alternative 2 (Monitored Natural Attenuation) includes little construction and, comparatively, is easily implemented.

Alternatives 3, 4a, 4b, 5a, 5b, 6a, 6b, and 13 include construction of collection trenches. Design and construction of this technology is conventional and standardized.

Alternatives 5a and 5b include air sparging. This technology is less conventional and standardized than a collection trench. Some testing will be required.

Alternatives 6a, 6b, and 13 include a permeable treatment wall. This technology is relatively new (five years of proven performance). Some testing will be required. Long-term operation and maintenance (O&M) requirements and costs are unknown because of the short performance period.

Alternatives 7, 8, 12, and 13 include "pump and treat" technology. This technology is conventional. Alternatives 9, 10, and 11 include accelerated restoration (recirculation), which is relatively unproven, particularly on the large-scale required for the FT-002 remediation. For Alternatives 7 through 12, installation of components on the airfield will complicate implementation (both construction and O&M). Alternative 9 will be the most difficult to implement. It includes the construction of 61 wells on the airfield. These wells would be very difficult to access for O&M when the airfield is active. Alternative 9 also includes constructing a 1,500-gpm (2.2 million gallon per day) treatment plant. This is an extremely large facility for groundwater treatment. It is similar in capacity to a wastewater treatment plant for a small community. O&M for this system would be difficult. Significant downtime for O&M would be expected.

- **Cost** includes the capital and O&M cost of each alternative, as well as its present worth.

The present worth cost of each alternative, from lowest to highest, is listed below (in millions of dollars).

Alternative 1	$0
Alternative 2	$3.4
Alternative 3	$4.6
Alternative 4a	$6.3
Alternative 4b	$7.6
Alternative 8	$15.6
Alternative 13	$15.7
Alternative 7	$15.9
Alternative 6a	$16.2
Alternative 6b	$17.5
Alternative 12	$23.8

Alternative 11 $24.5
Alternative 5a $26.0
Alternative 10 $26.2
Alternative 5b $27.2
Alternative 9 $54.0

- **State acceptance** addresses technical and administrative concerns of the State with regard to remediation.

The NYSDEC has provided input during the selection of the remedy and preparation of the Proposed Plan.

- **Community acceptance** addresses public comments received on the Administrative Record and the Proposed Plan.

Community comments to the selected remedy were evaluated following the public comment period and are discussed in the Responsiveness Summary (Appendix B). As a general statement, the community concurs with the selected remedy.

11.0 PRINCIPAL THREAT WASTES

The NCP establishes an expectation that treatment that reduces the toxicity, mobility, or volume of the principal threat wastes will be utilized by a remedy to the extent practicable. The principal threat wastes for the FT-002/IA Groundwater OU include fuel and solvent-derived volatile organic compounds dissolved within groundwater. The selected interim remedy includes groundwater and air emissions treatments, which will capture and/or destroy contamination, thereby satisfying the statutory preference for treatment as a principal element of the remedy.

12.0 SELECTED INTERIM REMEDY

The USAF, in conjunction with USEPA, has selected the physical remedy portion of Alternative 13 (Collection/Treatment Between the Runway and Flightline, East Flightline Collection Trench, Idaho Avenue Permeable Treatment Wall, WSA Permeable Treatment Wall, and Pumping of the Core) and interim institutional controls as the interim remedy for the FT-002/IA Groundwater OU. The interim institutional controls are needed to minimize the exposure of any future users of property encompassed by the FT-002/IA Groundwater OU including USAF personnel, lessees/sublessees, transferees, and construction workers, as well as the environment, to hazardous substances. In addition, these interim controls are needed to maintain the integrity of the interim remedial action until the final remedy is selected and the remedial action is complete. Final institutional controls and how they are to be implemented will be addressed in the final ROD. The development and selection of this interim remedy is based on a consensus of opinions between the USAF, NYSDEC, and USEPA. This interim remedy provides the best balance between cost and effectiveness given all the alternatives examined. It provides a permanent solution to the extent practicable and is protective of human health and the environment. The interim remedy addresses groundwater contamination through control or treatment along all pathways of expected migration, and is expected to capture and treat an estimated 91 percent of the remaining groundwater contamination in the first 10 years of operation.

12.1 Identification of Interim Remedy

The selected interim remedy for remediation of the FT-002 Groundwater OU includes the following components.

- Interim institutional controls to prohibit the use of groundwater, restrict the discharge of groundwater, and prohibit development that would interfere with remedial operations

- A collection trench between the runway and flightline

- A groundwater treatment system, currently envisioned to be a covered aeration basin, to treat contaminated groundwater to levels below effluent criteria

- Extraction wells located in a portion of the plume core (defined as an area where total chlorinated hydrocarbon concentrations are greater than 1,000 µg/L), west of the runway

- A collection trench located just east of the flightline

- A permeable treatment wall along Idaho Avenue

- A permeable treatment wall located upgradient of the WSA drainage system

- Groundwater and surface water monitoring

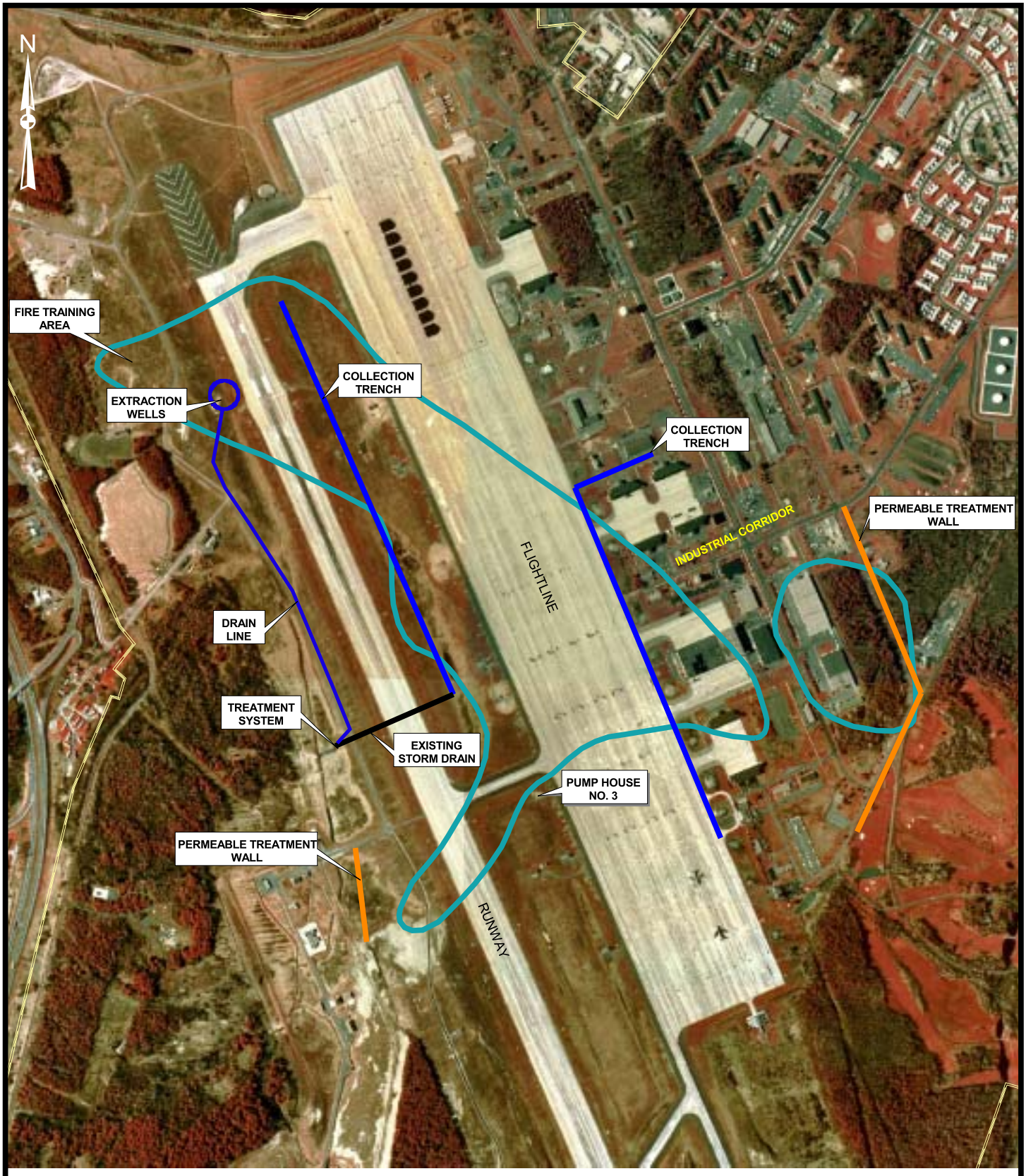
- Five-year site reviews

The major constructed components are depicted in Figure 9. Note that the conceptual design of these components is based on the expected migration of the existing groundwater contamination and on contingency factors. These components are discussed individually below.

Institutional Controls

Interim institutional controls (ICs) are a component of the selected interim remedy for the FT-002/IA Groundwater OU. ICs are administrative and legal actions which will be used to minimize the exposure of any future users of property encompassed by the FT-002/IA Groundwater OU, including USAF personnel, lessees/sublessees, transferees, and construction workers, and the environment, to hazardous substances. The interim ICs will also be used to maintain the integrity of the interim remedial action until the final remedy is selected and the remedial action is complete.

The interim institutional controls shall be maintained on all land and groundwater within the boundaries of the FT-002/IA Groundwater OU. The boundaries are shown in Figure 10. The



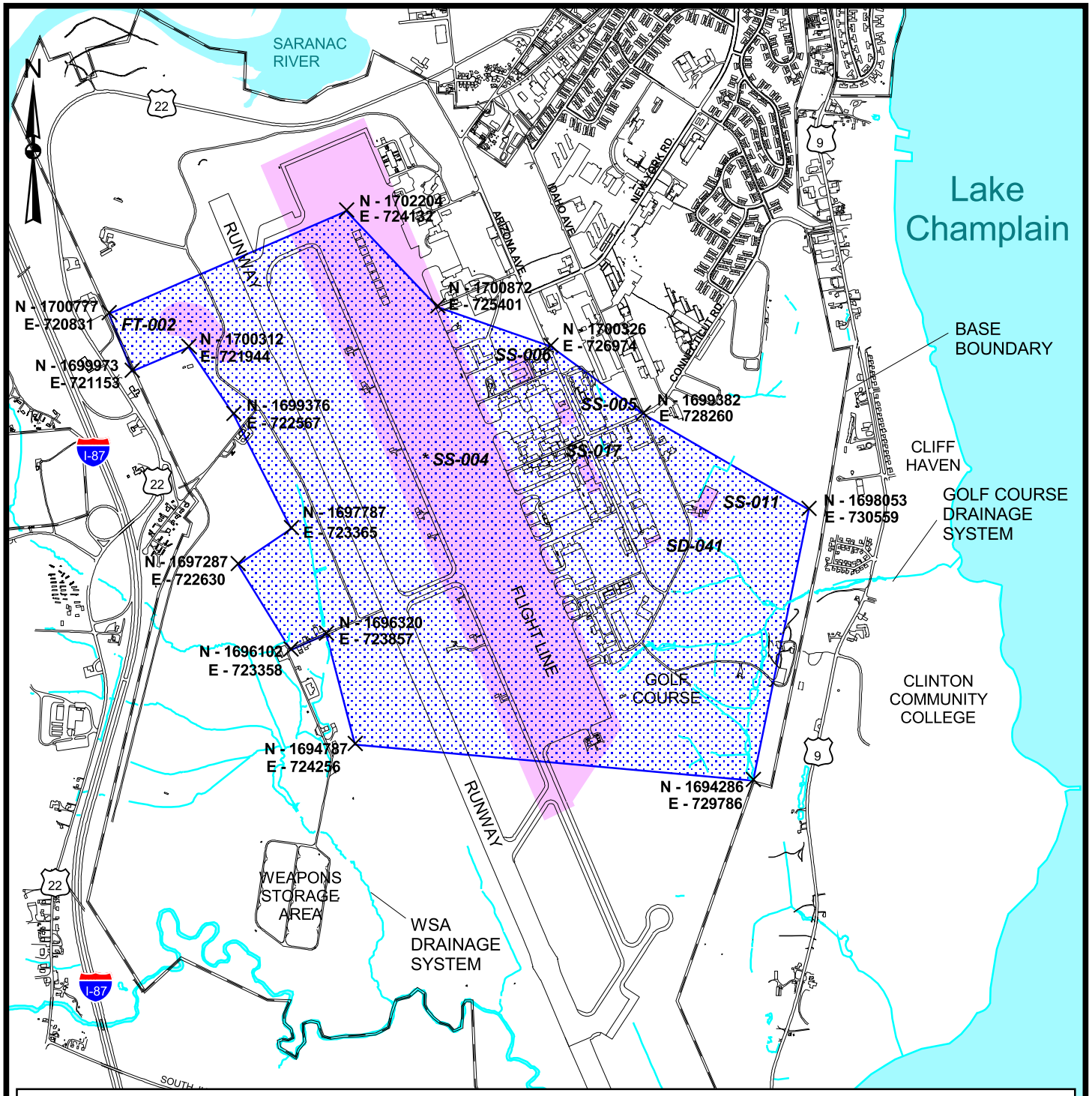
Legend

Approximate Extent of Chlorinated Hydrocarbons in Groundwater (10 ug/L isopleth)

1200 0 1200 Feet

URS Consultants, Inc.	LOCATION OF PREFERRED ALTERNATIVE COMPONENTS	FIGURE 9

J:\0100013\DB\GIS\1999\wgoperunit.apr PREFERRED ALTERNATIVE
7/24/2001



Legend

Sites Included in FT-002/IA Groundwater OU

Limits of Deed Restrictions to Prohibit Groundwater Use

Surface Water Bodies

* - Boundary of site SS-004 is outside of the boundary of the FT-002/IA Groundwater OU. However the sources of groundwater contamination associated with SS-004 are within the boundary of the FT-002/IA Groundwater OU (See Figure 5).

NOTES:

(1) COORDINATES ARE NEW YORK STATE PLANE GRID COORDINATES NORTH AMERICAN DATUM 1927. THE COORDINATES DEFINING THE AREA SHOWN WERE SCALED FROM A COMPUTER MAP FILE. SOME VARIANCE BETWEEN THE LOCATION OF THE LIMITS SHOWN ON THIS MAP AND THE ACTUAL GROUND LOCATION MAY OCCUR. THIS VARIATION SHOULD NOT EXCEED THE DISTANCE GREATER THAN ONE-FORTIETH (1/40th) OF THE MAP FILE SCALE USED TO DETERMINE THE COORDINATES. THE MAP FILE SCALE USED WAS 1" = 100' WITH A POSSIBLE VARIANCE OF 2.5 FEET.

(2) N - NORTHING , E - EASTING

2000 0 2000 Feet

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Consultants, Inc.

FT-002/IA GROUNDWATER OPERABLE UNIT
ANTICIPATED AREA INTERIM INSTITUTIONAL CONTROLS

FIGURE 10

N:\11168476.00000\GIS\Applications\wgoperunit.apr GROUNDWATER RESTRICTIONS 5/13/2003

interim institutional controls shall be maintained until the concentrations of hazardous substances in the groundwater have been reduced to levels that allow for unlimited exposure and unrestricted use and the groundwater collection, extraction, and treatment systems and all other related components of the remedy are no longer operational, or until revised in the final ROD for this remedial action.

The interim institutional controls objectives to be achieved through deed/lease restrictions and dig permits are:

- Prohibit the installation of any wells for drinking water or any other purposes which could result in the use of the underlying groundwater shown on Figure 10.

- Except for environmental response actions conducted by the USAF pursuant to CERCLA, prohibit discharge of groundwater that is withdrawn within the area shown on Figure 10 during construction dewatering to the ground or surface water, without prior approval of the NYSDEC through the State Pollution Discharge Elimination System (SPDES) permitting process.

- Prohibit property development or land use that would interfere with the proper operation of the interim remedy selected in this IROD. This includes the prohibition of any development within 20 feet of any above-ground structure or underground structure (including but not limited to pumping wells, underground and overhead electrical wiring, collection drains, piping, permeable treatment walls, groundwater treatment facilities, aeration basins, manholes, and pump stations) constructed as part of the physical remedy, or within 5 feet of any monitoring point which will be used in the monitoring of the physical remedy, without pre-approval by the USAF. USAF approval shall be obtained through the dig permit system maintained by the Air Force Real Property Agency's (AFRPA's) Plattsburgh office.

Collection Trench Between the Runway and Flightline

A collection trench will be installed to collect contaminated groundwater from the FT-002 site and part of the flightline area. As currently envisioned, an approximately 5,300-foot-long trench will consist of a perforated drain pipe set in a trench excavated to the deepest possible elevation and to allow gravity flow to the aeration basin (see below). This drain will be tied into the existing storm drain at the point where the existing storm drain crosses underneath the runway to the WSA drainage system.

Aeration Basin

A treatment system will be necessary to treat groundwater from the runway/flightline collection trench and the extraction wells in the plume core. As currently envisioned, a 1,000-square-foot aeration basin will be constructed to treat groundwater from the runway/flightline collection trench and the extraction wells in the plume core (see below). The basin will be covered to control air emissions. Treatment of the air emissions will be provided in a manner consistent with NYSDEC regulations. Treated water will be discharged to the WSA drainage system in a manner consistent with NYSDEC effluent discharge regulations. It is anticipated that groundwater treatment could be discontinued after approximately 15 years following system startup.

Plume Core Extraction Wells

Several vertical groundwater extraction wells will be constructed between the FT-002 site and the runway (as shown in Figure 9) to extract contaminated groundwater from the westernmost portion of the plume core. Five extraction wells were assumed in costing the preferred alternative; the actual number of wells will be determined during design. The extracted groundwater will be transported via a constructed drain line and discharged to the aeration basin.

Collection Trench Along the Eastern Edge of Flightline

As currently envisioned, an approximately 4,400-foot-long trench will be constructed in a manner similar to the runway/flightline trench. The collection pipe will be placed at the deepest possible elevation to allow gravity flow to the Golf Course drainage system.

Based on evaluations using groundwater modeling and the results of sampling at the Golf Course, Golf Course streams should not be impacted negatively by discharge from this collection trench. However, because of uncertainties associated with the model, groundwater treatment at the Golf Course is included as a contingency measure. If results of system effluent sampling (conducted after construction of the remedy) show effluent criteria exceedances, then this contingency measure will be implemented. In either case, discharge will be accomplished in a manner consistent with NYSDEC effluent discharge regulations.

Permeable Treatment Wall Along Idaho Avenue

To limit eastward migration of groundwater contamination, permeable treatment wall, currently envisioned to be approximately 2,900 feet long, will be installed along Idaho Avenue as shown in Figure 9. Reactive media will be placed in a trench at this location from above the water table to the top of the clay unit. The reactive media will form an uninterrupted curtain in the unconfined sand aquifer along the entire length of the wall.

As a contingency measure, a collection trench could be installed to serve the same function as the permeable treatment wall at this location. This trench would be constructed, and discharge handled, as discussed for the collection trench along the eastern edge of the flightline, including a contingency for treatment of the collected groundwater.

A decision regarding whether a permeable treatment wall or a collection trench will be applied along Idaho Avenue will be made jointly by the USAF, USEPA, and NYSDEC during the design process. The permeable treatment wall's advantage is that contamination is destroyed in situ, while the collection trench's advantage is that it would be more easily constructed and is less costly. Both options would be equally as effective in preventing further migration of groundwater contamination.

Permeable Treatment Wall Upgradient From WSA

To limit westward migration of a small arm of groundwater contamination traveling toward the WSA drainage system, an approximately 800-foot-long permeable treatment wall will be installed, as shown in Figure 9. The final location and orientation of this wall will be based on the results of a predesign boring program; this program would provide data to evaluate the depth to clay and the water table surface, factors which impact cost and constructability. Like the Idaho Avenue wall, reactive media will be emplaced in a trench at this location from above the water table to the top of the clay unit. Groundwater will be monitored, and data will be evaluated to determine if the wall is meeting its goal.

Groundwater and Surface Water Monitoring

As currently envisioned, a conceptual groundwater monitoring plan would include the installation of about 10 new monitoring wells and sampling of approximately 46 monitoring wells for VOCs (25 on a semiannual basis and 21 every five years). Conceptually, these wells will serve at least 3 purposes: to serve as sentry wells; to help determine whether or not each of the remedial components is working; and to determine when groundwater ARARs have been achieved throughout the FT-002/IA Groundwater OU. Surface water samples for VOCs would be collected from nine locations at the Golf Course and WSA drainage systems (five quarterly and four annually). Details regarding proposed locations for these monitoring points are given in the FS (URS 2001d). The actual frequency, locations, and parameters sampled for would be developed in coordination among the USAF, NYSDEC, and USEPA during the design process and detailed in a monitoring plan. Modifications to the monitoring plan may be made in the future as necessary and appropriate, in consultation with NYSDEC and USEPA, based upon data analysis results.

Five-Year Site Review

Every five years (at minimum) after initiation of this interim remedial action, a review of the selected interim remedy will be undertaken by the USAF and USEPA in accordance with Section 121(c) of the CERCLA. Remedial progress will be evaluated as part of the review.

12.2 Comparison of the Selected Interim Remedy to Nine USEPA Criteria

The USEPA has developed nine evaluation criteria, which are specified in the National Contingency Plan, that are used to assess remedial alternatives. These criteria are listed in Table 5 and compared to USAF's selected remedy.

TABLE 5
COMPARISON OF PREFERRED ALTERNATIVE TO USEPA EVALUATION CRITERIA

CRITERION	DESCRIPTION OF CRITERION	COMPARISON OF ALTERNATIVE TO CRITERION
Overall Protection of Human Health and the Environment	Addresses whether a remedy provides adequate protection to human and ecological receptors.	The preferred alternative is protective of human health and the environment. It includes measures to reduce the time required to restore groundwater and surface water to ARARs. The extent of the plume and, therefore, the site risk decreases over time for this alternative. This alternative also includes measures that limit the extent of plume migration that further protects human health and the environment. Institutional controls to prevent groundwater use also provide protection during remediation.
Compliance with ARARs	Addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of all state and federal environmental statutes.	Chemical-specific ARARs for groundwater should be achieved in an estimated time period of 80 years and chemical-specific ARARs for surface water will be achieved almost immediately after successful operation of the trench and treatment system between the runway and flightline is achieved.
Long-Term Effectiveness and Permanence	Refers to the magnitude of residual risk and the ability of the remedy to maintain reliable protection of human health and the environment once cleanup goals have been met.	The risk for groundwater ingestion will be reduced to an acceptable level after remediation. Groundwater and surface water concentrations will be at or below ARAR levels. During the remediation period, monitoring and deed and lease restrictions will adequately and reliably protect human health and the environment. Institutional controls and monitoring would be discontinued when groundwater restoration is complete.

TABLE 5 (Continued)

CRITERION	DESCRIPTION OF CRITERION	COMPARISON OF ALTERNATIVE TO CRITERION
Reduction of Toxicity, Mobility, or Volume	Addresses the anticipated performance of treatment technologies employed in the remedy.	The aeration basin included in the preferred alternative will remove an estimated 8,000 pounds of chlorinated compounds from groundwater during the first 10 years of operation. This is approximately 91% of the estimated quantity of chlorinated compounds presently in groundwater. The two permeable treatment wells also will remove and treat contamination from groundwater.
Short-Term Effectiveness	Refers to the speed with which the remedy achieves protection, as well as the remedy's potential to create adverse impacts during its implementation.	Intrusive activities required for construction of two collection trenches and two permeable treatment walls would produce a small potential risk to workers and the community, mainly from air emissions. However, potential risk could be minimized easily by implementing standard environmental health and safety measures. Groundwater would be restored to ARARs in an estimated time period of 80 years and surface water (a portion of the WSA drainage stream) would be restored to ARARs almost immediately after successful operation of the trench and treatment system between the runway and flightline is achieved.
Implementability	Addresses aspects of implementing the remedy such as the ability to construct and operate technologies, reliability, ability to monitor effectiveness, availability of materials, permitting, and coordination with other agencies.	The preferred alternative is feasible. Design and construction of all the technologies except the permeable treatment walls are conventional and standardized. Bench-scale testing (and possibly pilot testing) would be required to prove the effectiveness of the permeable treatment walls. As an alternative to the permeable treatment wall along Idaho Avenue, a collection trench could be installed

TABLE 5 (Continued)

CRITERION	DESCRIPTION OF CRITERION	COMPARISON OF ALTERNATIVE TO CRITERION
		to serve the same function in the preferred alternative. Groundwater and surface water monitoring would reliably test the effectiveness of remediation.
Cost	Refers to the capital and O&M cost of a remedy and its present worth.	The cost to construct the elements of the preferred alternative is $9.5 million (capital cost). It is expected that $370,000 will be needed annually to operate the remedial systems and to perform monitoring. The overall present worth is $15.7 million.
State Acceptance	Addresses the technical and administrative concerns of the State with regard to remediation.	The NYSDEC has provided input during the selection of the remedy and preparation of the Proposed Plan.
Community Acceptance	Addresses public comments received on the Administrative Record and the Proposed Plan.	Community comments to the selected remedy were evaluated following the public comment period and are discussed in the Responsiveness Summary (Appendix B). As a general statement, the community concurs with the selected remedy.

Note: The estimates of cleanup timeframes and mass of contaminants treated are based on the groundwater transport model and are imprecise. That is, the estimates are based on projections of the model several decades into the future so results cannot be regarded with absolute certainty. The accuracy of the estimates, however, meets the goals of USEPA RI/FS guidance with respect to evaluating and comparing alternatives.

13.0 STATUTORY DETERMINATIONS

This interim action is protective of human health and the environment. The interim action specified by this IROD is an interim solution only, and the interim remedy selected in this IROD is expected to be consistent with the permanent solution that will serve as the final remedy in the final ROD. This action utilizes permanence and treatment technologies to reduce the toxicity, mobility, and volume of contaminants to the maximum extent practicable and thus supports that statutory mandate. Subsequent actions, specifically finalization of final institutional controls and how they are to be implemented, will be addressed within 6 months of signature of this IROD, in the draft - final ROD for the final response action. Because this interim remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted to ensure that the interim remedy continues to provide adequate protection of human health and the environment, within five years after commencement of the remedial action.

TABLE 6
PLATTSBURGH AFB FT-002/IA GROUNDWATER OU
MATRIX OF COST AND EFFECTIVENESS DATA

Alternative No.	Description	Present Worth Cost *	Long Term Effectiveness And Permanence	Reduction of TMV of Contamination Through Treatment	Short Term Effectiveness
1	No Action	$ 0	Achieves goals in 190 years	Does not Reduce TMV Through treatment	Is not protective of human health and the environment (HHE)
2	Monitored Natural Attenuation	$ 3.4	Achieves goals in 190 years	Does not Reduce TMV Through treatment	Protects HHE immediately with the implementation of groundwater use restrictions
3	Collection/Treatment (C/Tt) Between Runway and Flightline (FL)	$ 4.6	Achieves goals in 120 years	7,600 lbs. Treated in first 10 years and 8,000 lbs. treated overall	Protects HHE immediately with the implementation of groundwater use restrictions
4a	C/Tt Between Runway and FL and East FL Collection Trench (CT)	$ 6.3	Achieves goals in 100 years	7,600 lbs. Treated in first 10 years and 8,000 lbs. treated overall	Protects HHE immediately with the implementation of groundwater use restrictions
4b	C/Tt Between Runway and FL, East FL CT, and Idaho Avenue CT	$ 7.6	Achieves goals in 80 years	7,600 lbs. Treated in first 10 years and 8,000 lbs. treated overall	Protects HHE immediately with the implementation of groundwater use restrictions
5a	C/Tt Between Runway and FL and East FL Sparging	$ 26.0	Achieves goals in 100 years	7,600 lbs. Treated in first 10 years and 8,000 lbs. treated overall	Protects HHE immediately with the implementation of groundwater use restrictions
5b	C/Ct Between Runway and FL , East FL Sparging, and Idaho Avenue CT	$ 27.2	Achieves goals in 80 years	7,600 lbs. Treated in first 10 years and 8,000 lbs. treated overall	Protects HHE immediately with the implementation of groundwater use restrictions
6a	C/Ct Between Runway and FL and East FL Permeable Treatment Wall (PTW)	$ 16.2	Achieves goals in 100 years	7,600 lbs. Treated in first 10 years and 8,000 lbs. treated overall	Protects HHE immediately with the implementation of groundwater use restrictions
6b	C/Ct Between Runway and FL, East FL PTW, and Idaho Avenue CT	$ 17.5	Achieves goals in 80 years	7,600 lbs. Treated in first 10 years and 8,000 lbs. treated overall	Protects HHE immediately with the implementation of groundwater use restrictions
7	Containment of Plume Core	$ 15.9	Achieves goals in 170 years	900 lbs. treated in first 10 years and 4,700 lbs. treated overall	Protects HHE immediately with the implementation of groundwater use restrictions
8	Containment of Plume Core – Alternate Cleanup Levels	$ 15.6	Achieves goals in 170 years	900 lbs. treated in first 10 years and 4,700 lbs. treated overall	Protects HHE immediately with the implementation of groundwater use restrictions
9	Accelerated Restoration of Entire Plume	$ 54.0	Achieves goals in 60 years	8,800 lbs. Treated in first 10 years and 8,800 lbs. treated overall	Protects HHE immediately with the implementation of groundwater use restrictions
10	Accelerated Restoration of Plume Core	$ 26.2	Achieves goals in 140 years	7,500 lbs. Treated in first 10 years and 8,700 lbs. treated overall	Protects HHE immediately with the implementation of groundwater use restrictions
11	Accelerated Restoration of Plume Core – Alternate Cleanup Levels	$ 24.5	Achieves goals in 140 years	7,500 lbs. Treated in first 10 years and 8,700 lbs. treated overall	Protects HHE immediately with the implementation of groundwater use restrictions
12	Containment Of Entire Plume	$ 23.8	Achieves goals in 120 years	600 lbs. treated in first 10 years and 5,000 lbs. treated overall	Protects HHE immediately with the implementation of groundwater use restrictions
13 (Selected Remedy)	C/Tt Between Runway and FL, East FL CT, Idaho Avenue PTW, WSA PTW, and Pumping of Core	$ 15.7	Achieves goals in 80 years	8,000 lbs. Treated in first 10 years and 8,200 lbs. treated overall	Protects HHE immediately with interim groundwater use and discharge restrictions. This IROD does not address the selection of final institutional controls and how they are to be implemented.

TABLE 6 (Continued)

Acronyms: CTt (Collection/Treatment), FL (Flightline), CT (Collection Trench), PTW (Permeable Treatment Wall), TMV (Toxicity, Mobility, or Volume), and HHE (Human Health and the Environment)
* Present Worth Cost Given in Millions of Dollars

14.0 DOCUMENTATION OF SIGNIFICANT CHANGES

There are no significant changes between the preferred alternative presented in the Proposed Plan and the selected interim remedy presented in this Interim Record of Decision. It should be noted, however, that in order to initiate cleanup of the FT-002/IA Groundwater OU as expeditiously as possible, this IROD includes the physical remedy portion of Alternative 13 (Collection/Treatment Between the Runway and Flightline, East Flightline Collection Trench, Idaho Avenue Permeable Treatment Wall, WSA Permeable Treatment Wall, and Pumping of the Core), and interim institutional controls, as the interim remedy for the FT-002/IA Groundwater OU. Final institutional controls, and how they are to be implemented, will be addressed in the final ROD. Although the interim action specified in this IROD is an interim solution only, the interim remedy specified in this IROD is expected to be consistent with the permanent solution that will serve as the final remedy in the final ROD.

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GLOSSARY

Accelerated Restoration: A pump-and-treat restoration process by which groundwater is pumped out of an aquifer faster than the rate of normal groundwater recharge. The pumped water is reinjected into the aquifer after treatment so that water is recirculated through the aquifer at a rapid rate. Also called soil washing.

Administrative Record: A file established and maintained in compliance with Section 113(K) of the Comprehensive Environmental Response, Compensation, and Liability Act consisting of information upon which the lead agency bases its final decisions on the selection of remedial method(s) for a Superfund site. The Administrative Record is available to the public.

Aeration: A remediation method whereby air is pushed through a contaminated media (e.g., soil or groundwater), facilitating compounds susceptible to volatilization to do so.

Applicable or Relevant and Appropriate Requirements (ARARs): ARARs include any state or federal statute or regulation that pertains to protection of public health and the environment in addressing certain site conditions or using a particular remedial technology at a Superfund site. A state law to preserve wetland areas is an example of an ARAR. The United States Environmental Protection Agency must consider whether a remedial alternative meets ARARs as part of the process for selecting a remedial alternative for a Superfund site.

Aquifer: A water-bearing formation or group of formations.

BTEX: Volatile organic compounds (benzene, toluene, ethylbenzene, xylene) typically associated with gasoline and other fuel product contamination.

Carcinogenic: Chemicals which, when exposure occurs at a particular level, may produce cancer.

Chlorinated Compounds: An organic compound that contains chlorine such as trichloroethene (TCE) and dichloroethene (DCE). Also referred to as chlorinated hydrocarbons or chlorinated solvents.

Collection/Treatment: Collecting and treating groundwater to remove contamination. Collection can be accomplished by wells or trenches. For volatile organic compounds, treatment is usually by air stripping or carbon polishing; cleaned water is returned to the ground or discharged to nearby surface water.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The act requires federal agencies to investigate and remediate abandoned or uncontrolled hazardous waste sites.

Containment: A remedial measure whereby contaminants in groundwater are to prevented from migrating by a barrier. The barrier can be physical (e.g., slurry wall) or hydrologic (line of pumping wells that reverse the direction of groundwater flow).

Contaminant Plume: A volume of contaminated groundwater with measurable horizontal and vertical dimensions. Plume contaminants are dissolved in and move with groundwater.

Ecological Receptors: Fauna or flora (plant and animals) in a given area that could be affected by contaminants in surface soils, surface water, and/or sediment.

Feasibility Study (FS): An evaluation to identify and evaluate appropriate remedial goals and remedial alternatives for a site based upon United States Environmental Protection Agency criteria.

Floating Product: A chemical or mixture of chemicals in pure form (non-aqueous or not dissolved in water) that is of lighter density than water and therefore floats on the top of the water table.

Free Product: A chemical or mixture of chemicals in pure form (non-aqueous or not dissolved in water). The substance is free if it can be recovered by pumping.

Groundwater: Water found beneath the earth's surface that fills pores within materials such as sand, soil, gravel, and cracks in bedrock, and often serves as a source of drinking water if found in an adequate quantity.

Inorganic Compounds: A class of naturally occurring compounds that includes metals, cyanide, nitrates, sulfates, chlorides, carbonate, bicarbonate, and other oxide complexes.

Installation Restoration Program (IRP): The United States Air Force subcomponent of the Defense Environment Restoration Program (DERP) that specifically deals with investigating and remediating sites associated with suspected releases of toxic and hazardous materials from past activities. The DERP was established to cleanup hazardous waste disposal and spill sites at Department of Defense facilities nationwide.

Monitoring: Ongoing collection of information about the environment that helps gauge the effectiveness of a cleanup action. Information gathering may include groundwater well sampling, surface water sampling, soil sampling, air sampling, and physical inspections.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): The NCP provides the organization, structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants. The NCP is required under CERCLA and the Clean Water Act, and USEPA has been delegated the responsibility for preparing and implementing the NCP. The NCP is applicable to response actions taken pursuant to the authorities under CERCLA and the Clean Water Act.

National Priorities List: USEPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under the Superfund program.

Natural Attenuation: Processes by which contaminant levels are reduced in nature. Contaminants in soil or groundwater are reduced by aerobic (oxygen-using) bacteria, other biological activity, volatilization, and dilution/dispersion.

New York State Registry of Inactive Hazardous Waste Sites: The state's compilation of all known hazardous waste sites, comprising nine volumes with site descriptions and locations. (Copies available for review in NYSDEC offices).

Noncarcinogenic: Chemicals that may produce adverse health effects that are not related to cancer.

Operation and Maintenance. (O&M): A step in the remedial program. While a site is being remediated it is overseen to make sure that the remedy is working as planned and that the construction remains operational.

Operable Unit (OU): A separate and distinct remedial project that is part of a large, complex hazardous waste site. Each OU has its own Record of Decision, remedial investigation, feasibility study, design and construction.

Organic Compounds: Any chemical compounds built on the carbon atom, i.e., methane, propane, phenol, etc.

Permeable Treatment Wall: A remedial measure whereby contaminated groundwater passes through a reactive media (usually an iron filings-type material) and a chemical reaction occurs destroying the contamination.

Polycyclic Aromatic Hydrocarbons (PAHs): Compounds often associated with combustion process and distillation tars.

Proposed Plan: A public document that solicits public input on a recommended remedial alternative to be used at a National Priorities List (NPL) site. The Proposed Plan is based on information and technical analysis generated during the RI/FS. The recommended remedial action could be modified or changed based on public comments and community concerns.

Product: A chemical or mixture of chemicals in pure form (nonaqueous or not dissolved in water).

Record of Decision (ROD): A public document that explains the remedial alternative to be used at a National Priorities List (NPL) site. The ROD is based on information and technical analysis generated during the remedial investigation, and on consideration of the public comments and community concerns received on the Proposed Plan. The ROD includes a Responsiveness Summary of public comments.

Remedial Action: An action that stops or substantially reduces a release or threat of a release of hazardous substances that is serious but not an immediate threat to human health or the environment.

Remedial Alternatives: Options evaluated to address the source and/or migration of contaminants to meet health-based or ecology-based remediation goals.

Remedial Investigation (RI): An investigation that determines the nature and extent and composition of contamination at a hazardous waste site. It is used to assess the types of remedial options that are developed in the feasibility study.

SARA: The Superfund Amendments and Reauthorization Act of 1986 amended the 1980 CERCLA environmental statues. The amendments re-authorized the federal Superfund which had expired in 1985 and established the preference for remedies that permanently reduces toxicity, volume or mobility of hazardous constituents.

Semivolatile Organic Compounds (SVOCs): Organic constituents which are generally insoluble in water and are not readily transported in groundwater.

Solvents: Organic liquids used to dissolve grease and other oil-based materials. Many solvents are toxic at high concentrations.

Source: Area at a hazardous waste site from which contamination originates.

Source Control: A remedy that addresses contamination problems at their source, rather than at some other more distant point along the chain of exposure.
Sparging: A remedial action that involves injecting air into the soil's saturated zone below or within the zone of contamination. Contaminants are entrained in the air and may be discharged to the atmosphere at the surface.

Superfund: The trust fund, created by CERCLA out of special taxes, used to investigate and clean up abandoned or uncontrolled hazardous waste sites. Out of this fund USEPA either: (1) pays for site remediation when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work or (2) takes legal action to force parties responsible for site contamination to cleanup the site or pay back the federal government for the cost of the remediation. Federal facilities are not eligible for Superfund monies.

Terrestrial Wildlife: Animals living on land (e.g., reptiles, small mammals, small birds, predatory mammals, predatory birds).

To Be Considered (TBC): Federal and state policies, advisories, and other non-promulgated health and environment criteria, including numerical guidance values, that are not legally binding. TBCs are used for the protection of public health and the environment if no specific ARARs for a chemical or other site conditions exist, or if ARARs are not deemed sufficiently protective.

Vadose Zone: The volume located between the ground surface and the water table. Also known as the unsaturated zone.

Volatile Organic Compounds (VOCs): Organic constituents which tend to volatilize or to change from a liquid to a gas form when exposed to the atmosphere. Many VOCs are readily transported in groundwater.

APPENDIX A

TRANSCRIPT OF PUBLIC MEETING

PUBLIC MEETING BRIEFING
FOR
THE PROPOSED PLANS FOR SITES
FT-002, FIRE TRAINING AREA/INDUSTRIAL AREA
GROUNDWATER OPERABLE UNIT
AND
SS-0017, BUILDING 2774 SOIL OPERABLE UNIT

Taken on Monday, February 4, 2002
at 7:00 p.m. at the Old Courthouse
Plattsburgh, New York.

APPEARANCES:

MICHAEL SOREL, Chairman
BRUCE PRZYBYL, URS Greiner, Inc.
STEVEN GAGNIER, AFBCA
DAVID FARNSWORTH, AFBCA

COURT REPORTERS ASSOCIATES
117 Bank Street, Burlington, Vermont 05401
1-800-439-4593

FEBRUARY 4, 2002; 7:00 P.M.

MR. SOREL: Okay. I'd like to begin the public meeting for the Proposed Plans for Sites FT-002, the Fire Training Area/Industrial Area Groundwater Operable Unit and SS-017, Building 2774 Soil Operable Unit.

I'm Mike Sorel, the BRAC Environmental Coordinator working for the Air Force Base Conversion Agency at Plattsburgh. I will be presiding over this meeting, the main purpose of which is to allow the public the opportunity to comment on the Air Force's actions for these sites.

Assisting me in tonight's presentation are Steve Gagnier and Dave Farnsworth with the Air Force Base Conversion Agency and Bruce Przybyl, the project manager for URS Greiner, Inc. We are here to provide answers to technical questions you may have about the remedial alternatives being considered by the Air Force.

Tonight's agenda will consist of a summary of data gathered at the sites and a description of the preferred remedial actions. After that, we will move to the most important part of this meeting -- the part where you provide your comments on the remedial actions.

First, however, I need to take care of several administrative details.

As you can see, everything being said here tonight is being taken down word-for-word by a professional court reporter. The transcript will become part of the Administrative Record for the sites.

We would like everyone to complete the Sign-in sheet at the door. We will use the sheet to review our mailing list for the sites.

At the conclusion of the presentation, we will open the floor to comments and questions. We request that all questions be held to the end of the presentation for each site. If you have a prepared statement you may read it out loud or turn it in without reading it. In any case, your comments will become part of the record. We have comment cards at the front table for your use for written comments. If you turn in any written comments, please write your name and address on them.

If you later decide to make a comment you may send additional comments to us at this address. We will accept comments until February 20, 2002. I will show this address slide again at the end of the meeting.

The final point is that our primary purpose tonight is to listen to you. We want to hear your comments on any issue that you are concerned about, and we will try to answer any questions you may have. We want you to be satisfied that the actions we take will properly and fully address the problems at the site.

Now I'd like to turn the meeting over to Bruce Przybyl.

MR. PRZYBYL: Good evening. In this portion of the presentation we will discuss the Air Force's Preferred Alternative for the Soil Operable Unit at Site SS-017. In order to simplify and to accelerate the remediation, the decision-making at the sites has been divided into two Operable Units or two parts: The Operable Units are the Groundwater Operable Unit and the Soil Operable Unit. This presentation will focus on the Soil Operable Unit.

Site SS-017 is situated in the central portion of the base in the industrial corridor along Arizona Avenue near the intersection of Connecticut Road. The site lies downgradient from the FT-002 site; therefore, the groundwater Operable Units of Site SS-017 and FT-002 were lumped together with other sites potentially impacted by contaminated

groundwater from FT-002 and the industrial corridor into one large operable unit. This large groundwater operable unit will be discussed at the next presentation.

This is FT-002 (unclear) 0017. Site SS-017 is located primarily between Buildings 2774 here and Building 2753, located here. 2774 was used for engine maintenance and 2753 was a machine shop. Contamination at the site is related to activities at a concrete drum pad which served as a waste accumulation point for Building 2774, that is located here. Contamination was discovered in soil near the pad in 1985. Site contaminants include chlorobenzenes and other chlorinated hydrocarbons such as trichloroethene. These compounds were used as cleaning solvents. Fuel-related compounds such as xylenes and naphthalene were also detected. When investigation of the soil contamination was expanded in the early 1990s, contamination was detected over a wider area in between the two buildings. Slide please.

Investigation at the site began in 1985 with a record search which indicated a potential that spills had occurred around the concrete drum pad. That was confirmed through the collection of a few

soil samples around the pad. By 1987, a site inspection was undertaken which included the collection of subsurface samples and a collection of groundwater from monitoring wells that were installed. Chlorobenzenes and other chlorinated hydrocarbons were detected in both soil and groundwater. In June 1992, the United States Air Force removed the pad and the contaminated soil surrounding it. Slide please.

This is the area where the removal action occurred. Removal action known as the IRM or Interim Remedial Measure consisted of additional sampling to delineate the contamination and the excavation and removal of 200 cubic yards of contaminated material was transported off base and incinerated. Next slide, please.

Also in 1992, the Air Force initiated a remedial investigation that consisted of additional well installations, groundwater sampling and a risk assessment. The investigation recommended a further Delineation of soil contamination at the site. Consequently, a supplemental delineation investigation was undertaken in 1996. This investigation looked at soil contamination at about 100 locations between and around Buildings 2774 and

2753. Seven areas of soil contamination were identified, and based on these results a second removal action was initiated to address the remaining soil contamination.

The areas of soil contamination are shown here in purple, these seven areas. Remedial systems were constructed to address these areas. Technologies employed include bioventing which is blowing air into the ground to promote biological activity that destroys contaminants; soil vapor extraction which is pulling air from the ground to strip contaminants from the soil and biosparging, pulling air below the water table to both strip volatile contamination and to promote biological activity. Blowers were connected to a series of underground piping to address each area. These are the blowers, south shed, north shed, and there was piping installed through each area where contamination was found. Next slide, please.

In the year 2000 a feasibility study was undertaken that assessed possible remedial courses of action at the site. The report consolidated existing data from the site assessed the progress of the second removal action and assessed risks posed to human health. The study recommended that the

existing remedial systems installed for the removal action continue to be run. Next slide, please.

A risk assessment was performed as part of the feasibility study that assessed potential health risks given a hypothetical residential reuse scenario. The assessment concluded that there are no significant risks posed to human health, given contact with the contaminated soils at the site. Next slide, please.

In 2001 another soil sampling event was undertaken to assess the progress of the second removal action. The system had been in operation for about four years at the time of the sampling. Samples were collected at locations that were found to be contaminated in the previous sampling events. Next slide, please.

This table is a comparison of contaminant concentrations before and after the second removal action was undertaken. As you can see, a substantial reduction in concentration has occurred as a result of this action. Concentrations are no longer considered to pose a threat to human health or groundwater resources at Site SS-017. Next slide, please.

Therefore, the Air Force is recommending that no

further action be taken at the site. Since there are no threats remaining at the site, no restrictions on reuse are necessary. Following the signing of the Record of Decision the systems currently operating at the site under the second removal action would be turned off and dismantled.

I'll turn it over to Mike Sorel for any questions.

MR. SOREL: Before we move on to the next site, I will open it up for any questions and if you do have any, please state your name for the record. No questions? Okay, Bruce.

MR. PRZYBYL: In this portion of the presentation we will discuss the Air Force's preferred alternative for the Fire Training Area and industrial area Groundwater Operable Unit. This operable unit is a combination of the groundwater operable units from several sites that are impacted by groundwater contamination from the Fire Training Area. The soil operable units for each of these sites are being handled separately from this comprehensive groundwater operable unit.

This graphic shows the location of the groundwater operable unit. It extends from the Fire Training Area to the west, also referred as Site

FT-002 all the way to the base boundary on the east, right across the base.

Primary source for groundwater contamination is the FT-002 site located here. Other sites whose groundwater operable units are combined with FT-002 within its operable unit includes Sites SD-041, Site SS-011, Site SS-017 SS-005, SS-006 and SS-004. These sites lie in the industrial corridor east of the flightline. Contaminant levels are highest in what is referred to as the plume core shown here in red. The core contains greater than one thousand parts per billion of chlorinated hydrocarbons.

Groundwater flows from the FT-002 site towards two drainage areas by three separate routes: Some water flows southeastward through the industrial corridor before emptying into the golf course drainage area. Follows this route right here and empties into the golf course drainage area. The streams in this area coalesce and flow into Lake Champlain.

Most of the contaminated groundwater from the FT-002 site flows to the drainage basin that lies between the runway and the flightline. The groundwater is discharged via a storm drainage system which empties into the drainage system that

flows through the Weapons Storage Area or WSA. It follows these routes here, this drainage basin and is captured by the storm drainage system and flows to the Weapons Storage Area drainage system.

The streams of the WSA coalesce and flow to the Salmon River at the base's southern boundary. A small portion of the contaminated groundwater from the FT-002 site flows around the basin between the runway and the flightline and empties directly into WSA streams, and that is this route here, a round basin that flows toward the WSA.

The Air Force has been routinely monitoring contaminant concentrations in the streams of both the WSA and golf course drainage systems. Only very low concentrations of contaminants, at concentrations below the New York State criterion, have been detected in the golf course stream, in this area right here. Contaminant concentrations in the WSA stream near the outfall of this storm drain that drains the basin between the runway and flightline do exceed New York State stream criteria in this area right. However, concentrations of these contaminants downstream are below New York State criteria.

Some residents are using groundwater for

drinking southeast of the base. These residents are shown here in red along Route 9. Contaminated groundwater is not reaching these drinking water wells. Next slide, please.

This is a profile of the geological materials from west to east across the base. Contamination in groundwater is present in an unconfined sand aquifer underlain by a clay confined unit. This is the sand and this is the clay. Groundwater does not flow between the sand unit and the till and bedrock aquifers that underlie the clay. Due to the low conductivity of the clay groundwater flow is retarded from moving into the lower units.

The Air Force has routinely been monitoring groundwater and bedrock and sand along the eastern base boundary. Contamination has not been detected in the bedrock aquifer anywhere on base or in the sand unit along the southeastern base boundary.

The Air Force has been monitoring groundwater along the boundary here, and we have not detected any contamination in sand or in bedrock, indicating that these users of groundwater are not at risk.

The clay lies near the surface to the east of the golf course, this area here. Water in the sand unit flowing from the west enters the golf course

streams at this point. Next slide, please.

There are two basic groups of contamination that are of concern for this operable unit: Chlorinated hydrocarbons are of the greatest concern because they do not readily biodegrade in groundwater, are readily mobile in groundwater and are toxic. When conditions are right, usually in an anaerobic or oxygen-depleted situation, chlorinated hydrocarbons do degrade. Trichloroethene is transformed to dichloroethene and dichloroethene is transformed to vinyl chloride. Fuel-related compounds, also known as the BTEX compounds, are readily biodegraded under normal conditions in groundwater. As a result the BTEX contamination has not traveled east of the flightline. As you can see from this graphic, the chlorinated hydrocarbons have traveled the furthest from the FT-002 source. That is shown in bluish-green here.

A second significant area of chlorinated hydrocarbon contamination is present upgradient from Site SS-011 west of Idaho Avenue, in this area here. Other minor sources may be present at Sites SD-041 and Site SS-004. The contamination at SS-017 has been already remediated as we found out in the first presentation. Now the chlorine hydrocarbons

are expected to migrate further to the east toward the golf course drainage and along the small arm of contamination that goes around the basin between the runway and the flightline here. However, this contamination is not expected to travel beyond the drainage basins. In contrast, the BTEX contaminant plume from FT-002 is in a state of equilibrium. Bioorganisms are consuming the BTEX contamination as fast as it is propagating in groundwater. Therefore, the BTEX plume is limited to the area shown in red. The source of contamination at the FT-002 site is a subject of a separate operable unit. The FT-002 site is here.

The Record of Decision for FT-002 operable unit has already been signed and cleanup of this source is ongoing. The remedy implemented for the FT-002 Source OU will effectively cut off any further degradation of the aquifer for the FT-002 site.

Some of the key concepts that have been developed through various investigations into the geology of groundwater contamination are that contamination is migrating into the sand aquifer but was not present in the bedrock aquifer because of the clay layer situated in between the two aquifers. Contamination is entering the golf course drainage

system and all the contaminant levels are expected to increase slightly in the future; concentrations are not expected to exceed New York State surface water criteria. Contamination is also entering the WSA drainage system. Only a portion of the drainage system contains concentrations of contaminants above New York State criteria. And last, contamination is not expected to migrate beyond base boundaries in surface water or groundwater. Next slide.

Risks posed to human health and the environment were assessed during investigations undertaken for the groundwater water operable unit. There are no risks to human health resulting from contamination in groundwater except in the case of potable use of the groundwater. Potable use of groundwater is not currently occurring at the base since a municipal water supply is available. Off-base potable users along Route 9 are not and are not expected to be affected by the contamination.

Risk posed to ecological receptors is present only in a portion of the WSA stream near the outfall of the storm drain draining the basin between the runway and the flightline. In this small section of stream a potential risk to fish species such as trout is present. Next slide.

Based on the results of various investigations of contaminated groundwater undertaken at the base, a feasibility study was undertaken to evaluate options to address the contamination. Now one term that is repeatedly used here in these study objectives is the term "ARAR". This stands for applicable and/or relevant and appropriate requirements. These are contaminant concentration levels established by applicable New York State or Federal law governing cleanup of contamination. The objectives of the study were to develop alternatives to prevent ingestion of groundwater containing contaminants at concentrations above groundwater ARARs; to restore impacted groundwater to ARARs; to prevent migration of groundwater containing contaminant concentrations above the ARARs beyond the base boundaries; and to restore surface water that has been impacted by contaminated groundwater to New York State surface water ARARs.

Next, please.

This graphic shows remediation goals for the groundwater operable unit. Remediation goals are set at ARARs. The goals are based on the New York State groundwater and surface water quality criteria since they are the most stringent applicable

requirements for these compounds. They are lower than the federal maximum contaminant levels. Next slide, please.

The feasibility study combined various technologies for cleanup of groundwater into 16 alternatives. The Alternatives are numbered 1 through 13. Alternative 4, 5 and 6 each have an A and B alternative. We will quickly describe all 16 alternatives.

Alternative 1 is no action. Inclusion of this alternative is required by USEPA Guidelines to serve as a baseline for comparing other alternatives.

Alternative 2 is monitored natural attenuation. In this alternative contaminants are allowed to be reduced by natural processes over a long period of time. The public is protected by the enplacement of institutional controls. These are deed restrictions that prohibit the installation of drinking water wells. These controls are part of all the alternatives, except for Alternative 1. In addition, groundwater and surface water would be closely monitored to insure that the contamination is moving in an expected manner and attenuating in the expected manner and no off-base migration is occurring. Monitoring is also a component of all

alternatives except for Alternative 1. Next slide, please.

Alternatives 3 through 6 employ variations of three basic technologies: The first technology shown here is a collection or interceptor trench. This is a drain placed in an excavated trench filled with gravel. In this way, a large quantity of contaminated groundwater can be collected and controlled. The water is collected in a pipe at the bottom of the trench and transferred to another location where the discharge is controlled.

The second technology is air sparging. In air sparging, air is pumped into groundwater to volatilize the contamination. It can also be applied in a trench, by placing horizontal perforated pipes at the bottom of trenches and pumping air through the pipes. Air then bubbles up through the aquifer. Contaminants are volatilized as they pass by this air curtain. So air bubbles up through the trench, water flows across the trench and coming out from the trench water has undergone volitilization and is cleaner. Next slide, please.

The third technology is a permeable treatment wall, shown here. Again an excavated trench is used. A reactive media is backfilled into the

trench. As contaminated groundwater passes through this media, it reacts with it and is cleaned up. Clean water then passes out the backside of the wall. Clean water flows through the trench where it reacts with the reactive material, contaminants are stripped from the material and clean water passes out the backside of the trench.

For chlorinated hydrocarbons a patented iron-based material is used; therefore, this technology tends to be expensive. Next slide.

Alternative 3 includes institutional controls and monitoring similar to all of the other alternatives except for Alternative 1. In addition, a major component is a large collection trench that would be constructed between the runaway and the flightline. Next slide, please.

This trench is shown here in blue. Because it collects water from that plume core which is located here, this trench would collect over 90 percent of the contamination currently present in the aquifer. Collected groundwater would be treated in a treatment system constructed west of the runaway at this location. Water would be collected here and treated here. The clean water would then be discharged into the WSA drainage system.

Because contaminated groundwater would no longer be discharging from the storm drain located between the runway and the flightline, contaminated portion of the WSA stream would be immediately cleaned up upon construction of this system.

WSA Alternative 4 has a collection trench east of the flightline to the components of Alternative 3. This trench would collect groundwater that has already escaped the influence of the trench between the runway and the flightline and is heading toward the industrial corridor. This trench is located here. And will collect groundwater that is right past this trench.

Alternative 3 which is this trench in blue; Alternative 4(a) includes both the trench in blue and the trench in green. Alternative 4(b) adds a third collection trench along Idaho Avenue as this trench shown in orange. The trench would collect contaminated groundwater that is already in the industrial corridor, looks like this. Next slide, please.

The variations of Alternative 5 and 6 are similar to Alternatives 4(a) and 4(b) except that different technologies are used to address the contaminated groundwater along the eastern edge of

the flightline. These technologies are air sparging for Alternative 5(a) and 5(b) and a permeable reaction barrier for Alternative 6(a) and 6(b).

Alternative 5(a) includes a collection trench between the runway and the flightline, and includes a biosparging wall along the eastern edge of the flightline. Alternative 5(b) adds a collection drain along Idaho Avenue. Alternative 6(a) includes a collection drain between the runaway and the flightline and a permeable reactive barrier wall at the eastern end of the flightline and then Alternative 6(b) adds a collection drain along Idaho Avenue, line of treatment to the components of 5(b) or 5(a), actually 6(a). Next slide, please.

Alternatives 7 and 8 utilize groundwater pumping from wells and treatment of contaminated groundwater as the primary remediation technology. The pumping of groundwater for these alternatives will be accomplished at the nose of a highly contaminated plume core, effectively cutting off its further migration. These wells would be located here and the treated groundwater would be injected downgradient of those wells.

Now Alternatives 7 and 8 differ in the time that this system would be shut down. For Alternative 7,

the system would be run until ARARs were achieved. For Alternative 8, the system would be shut down when a substantial reduction in contaminant concentration was achieved; then the groundwater would be attenuated to ARARs by natural processes.

Alternative 9 employs a variation on conventional pumping from wells and treatment by pumping at an accelerated rate with reinjection of the treated groundwater at a high rate. In this way, clean water is recirculated in the aquifer, washing the contamination from the aquifer. Next please.

Pumping injection wells are located throughout the contaminated plume. The pumping would continue until the ARARs were achieved. Next slide, please.

Alternatives 10 and 11 also employ the accelerated pump and treat technology that we just described for Alternative 9. For these alternatives the technology is only applied at a highly contaminated plume core -- next slide -- located in this area.

The two alternatives differ in the time that the systems would be shut down. For Alternative 10 the system would be run until ARARs were achieved. For Alternative 11 the system would be shut down when a

substantial reduction in contaminant concentrations are achieved, then the groundwater would be attenuated to ARARs by natural processes. Next slide, please.

Alternative 12 employs conventional pump and treat technology to contain the overall plume of groundwater contamination, thereby preventing its further migration into the industrial corridor. Next slide, please.

Pumping and injection locations for this alternative are shown here. Again, this system would be run until ARARs were achieved. Next slide.

And the last alternative, Alternative 13. This alternative is similar to Alternative 4 with a few variations and additions. Similar to Alternative 4(a) this alternative includes collection trenches between the runaway and the flightline and along the eastern edge of the flightline. Along Idaho Avenue, Alternative 13 specifies a permeable treatment barrier. In addition, a permeable reactive wall would be located, shown here in purple, along the small arm of contamination that has made its way around the basin between the runway and the flightline. On this graphic the collection trenches are shown in green here and in blue. The orange

line would be a permeable treatment wall and then this small purple line would also be a permeable treatment wall.

The last element of the alternative is a cluster of pumping wells that would be located here at the plume core area. These wells would pump the highly contaminated groundwater that would be transported into the treatment basin or treatment facility that also treats the captured water from the collection drain between the runway and the flightline. Next slide, please.

Alternatives were evaluated against nine criteria established by federal regulations to assess remedial alternatives. The alternatives were also compared to each other relative to these criteria. These criteria are: The overall protection of human health and the environment, compliance with ARARs, long-term effectiveness of the purposed remedy, reduction of toxicity, mobility and volume of contamination, short-term effectiveness, implementability, cost, state acceptance and of course community acceptance. Next slide, please.

Some of the important results of the evaluation are listed on this graphic. Regarding the most

important criteria, protection of human health and the environment, all alternatives except Alternative 1 are protective. This is a result of the institutional controls that would be employed to prevent human contact with the contaminated groundwater which is included in all alternatives except Alternative 1.

Regarding compliance with ARARs, all of the alternatives would achieve ARARs over differing periods of time. It should be noted, however, that even the most aggressive of the technologies existing to clean up groundwater contamination would still take decades to achieve ARARs. The alternatives also vary in the volume of contamination that is destroyed over time and they also vary in the cost.

Another important criterion is implementability. Some of the alternatives specify a number of pumping in the injection wells in the flightline area. These wells would require frequent routine maintenance. The maintenance activities would require very active coordination with flightline operations which would be somewhat cumbersome. It is expected that the base reuse will include extensive aircraft operations for the

foreseeable future. These types of alternatives are less implementable compared to the more passive systems such as collection trenches which require less maintenance, once constructed.

The effectiveness of the various alternatives was assessed by estimating the time it would take to achieve groundwater ARARs and quantifying the amount of contamination that each alternative would treat over time. By these measures, Alternative 9 is the most effective alternative. Alternatives 4(b) and 13 follow along the alternatives which are the most effective. Alternative 13 is in fact the second most effective. Nine is the best in terms of time to achieve ARARs and all other alternatives increase slightly. Alternative 13 is second best with 4(b), 5(b) and 6(b) in terms of the mass treated in the first ten years. Alternative 9 is the most effective, Alternative 13 is the second most effective, and then 3, 4(a) through 6(b) are the third most effective.

Of the alternatives that are the most effective, Alternative 9, however, is by far the most expensive. This alternative is also less implementable compared to Alternatives 13, 4, 5, and 6 because it would require frequent maintenance of

the wells in the area of flightline operations.

Alternatives 13 and 4(b) fall among the least expensive of the alternatives. Alternative 13 is the second most effective alternative and is substantially less expensive than Alternative 9, if we go back to where we started. Alternative 9 is a little bit more effective in terms of time to achieve ARARs and a little bit more effective in terms of mass treated, and yet if you look at the cost of these alternatives, Alternative 13 is more than three times as expensive as Alternative 13 (sic), so based on the balance of the effectiveness versus cost, the Air Force is recommending that Alternative 13 be selected as the preferred alternative for this operable unit. Next slide, please.

Next we'll explain the preferred alternative components in a little more detail. The institutional controls for this alternative are deed restrictions. These are prohibition of withdrawal of groundwater for public use; control of discharge groundwater withdrawn during construction; prohibition of land use that interfere with remedial operations. To the west of the flightline a collection trench would be constructed between the

runway and the flightline. Pumping wells would also be installed west of the flightline and a treatment system would be constructed there to collect groundwater water for these two systems. So groundwater would be collected from the plume core area by a collection drain located between the flightline and the discharge to the treatment system located west of the flightline and construction walls would also be located in the plume core and the water would be transported to the same treatment system. It would be combined, treated and then discharged according to New York State effluency permit procedures. Next slide, please.

Another element of the preferred alternative is a collection drain located along the eastern edge of the flightline. That is located here. Groundwater would be collected in a collection drain located on the eastern edge of the flightline. Next, please.

Two permeable reactive walls or treatment walls are specified under this alternative. One of the walls would be located on the nose of a small arm of contamination that has traveled around the basin between the runway and the flightline. A second wall would be constructed along Idaho Avenue. The permeable reactive walls would be located along

Idaho Avenue and also here just upgradient from the WSA drainage area.

Now there is a contingency specified for -- contingency would be specified for this treatment wall in the Record of Decision. The backup alternative for that would be a collection drain. Now it's envisioned that in the design process the pros and cons of each of these potential technologies for application on Idaho Avenue would be weighed and during the design process a decision would be made and one of the alternatives or technologies would be achieved for this treatment line along Idaho Avenue. Next slide, please.

The alternative also includes groundwater and surface water monitoring that will be used to evaluate the effectiveness of the alternative components with time and to insure that no off-base migration is occurring.

The last element of the preferred alternative would be five-year reviews. The effectiveness of the remedy of the alternative achieving protection of human health and the environment would be reviewed according to USEPA Guidelines every five years.

At this time I will turn it over to Mike Sorel

for questions and answers.

MR. SOREL: Thank you, Bruce.

At this time I'd like to open up the meeting to any comments or questions. Anybody?

MR. VON BARGEN: I have two questions. The first question would deal with the topic that we spoke of in the base RAB and that would be within the decision remedy plan the issue regarding the town's municipal workers that might find themselves working within the confines of the contaminated plume and has that been addressed in the selection of the remedy or anywhere for that matter?

MR. SOREL: Actually we have looked at that before, in fact we did a study on that. Bruce, I don't know if you can speak to that at all.

MR. PRZYBYL: Well, one of the recommended institutional controls talks about treating this groundwater that is collected during construction activities in this contaminated area, and the Air Force has made contingency for that treatment if it becomes necessary.

MR. VON BARGEN: Is that a separate component then outside by itself?

MR. SOREL: Outside by itself, right. We have already contracted for the construction of a portable treatment system that we can use in many instances like that, but if your question was also in regards to health and safety, I don't know if you recall we actually did a study on that and we did pass that out, I believe, at one of our RAB meetings and if you need a copy of that --

MR. VON BARGEN: My second question could be in regard to the five-year review. What kind of a -- that apparently is a prototypical time frame that is utilized in evaluating the success of the remedies. Are there provisions in there that shorten up that time frame based on your monitoring? If you saw something prior to a five-year review period would there be any process of information flowing to the regulatory community? Would there be an opportunity to look more carefully at the information rather than have a five-year period?

MR. PRZYBYL: Well reports would be generated at a greater frequency than five years. The monitoring would be done annually or semi-annually, twice per year, and reports would be generated after each event so that the Air Force and regulatory community could review these results as

they were generated. The five-year review pulls all the information into a more formal way that is specified under the CERCLA Regulations.

MR. GERAGHTY: Five years at a minimum to get the results and we take a look at them and if we see something we feel needs to be addressed we'll raise it. And with regard to the institutional controls we have had some sites already where we put in institutional controls and we say, you know, we don't want construction activities to interfere with the monitoring of those wells, and if it needs to happen, sewer line needs to go through there or something, then we review those plans to see if we think that the workers would be at any risks from what we know to be in the groundwater. So there are, you know, matters in place to make sure that they get addressed, those kind of issues.

MR. SOREL: Dan, can you --

MR. GERAGHTY: I'm Dan Geraghty from the New York State Department of Health.

MR. VON BARGEN: So in the semi-annual or annual information at year three, if you seem to be seeing something different than what you would have expected, there would be some conferring among the regulatory agencies and the Air

Force?

MR. SOREL: I think so. I think that the opportunity is always there to do that as we submit these documents. We are constantly submitting documents on a routine basis for landfills now, and correct me if I'm wrong, either of you, that I would expect that we would certainly discuss that if there was something that jumped out at you.

MR. GERAGHTY: We review those and nothing has come up at this site but at other sites now we have monitoring reports where, for instance, they have filters on residential wells and just last week I had called up the DEC because it appeared there was a breakthrough in one of those wells so we had the filter changed. And we get these reports and take a look at them and if there is anything irregular we have an opportunity to get something done about it.

MR. SOREL: Thank you. Any other comments, questions?

If you should later decide to make additional comments on the proposed actions, please mail them to this address by February 20, 2002. Also I'd like to add that the proposed plans are available at the

Information Repository located in Special Collections of the Feinberg Library at SUNY Plattsburgh.

That concludes this meeting. Thank you.

(Meeting adjourned at ten minutes of eight.)

C E R T I F I C A T E

I, Carol A. Boone, Notary Public and Court Reporter, do hereby certify that the foregoing pages, numbered 2 through 34, inclusive, are a true and accurate transcription of my stenographic notes of a PUBLIC MEETING BRIEFING FOR THE PROPOSED PLANS FOR SITES FT-002, FIRE TRAINING AREA/INDUSTRIAL AREA GROUNDWATER OPERABLE UNIT AND SS-017, BUILDING 2774, SOIL OPERABLE UNIT, taken before me on February 4, 2002, as to which a transcript was duly ordered.

I further certify that I am not a relative or employee of, nor do I have any interest in the outcome of the matter.

Carol A. Boone

Carol A. Boone, Court Reporter

PUBLIC MEETING/FT-002(GW) & SS-017 - FEBRUARY 4, 2002

SIGN-IN SHEET

NAME	ORGANIZATION	PHONE NUMBER
Marcia Wikosz	TAI & HSLC. Inc.	566-8729
Shawn McCabe	URS Corp.	716 684-5576
Chris Boone	Saint Regis Mohawk Tribe, DNR	802-862-4593
Bruce Przybyl	URS Corp.	518-566-7022
Dan Geraghty	NYSDOH	518-402-7890
James Quinn	NYSDEC	518-402-9623
Jeff Stott	NYSDEC	518-897-1243
Philip Barney	NFOP	563-8125

APPENDIX B

RESPONSIVENESS SUMMARY
NYSDEC CONCURRENCE LETTER

DEPARTMENT OF THE AIR FORCE
AIR FORCE BASE CONVERSION AGENCY

February 25, 2002

MEMO FOR RECORD

SUBJECT: Responsiveness Summary: Fire Training Area (FT-002)/Industrial Area Groundwater Operable Unit

A. OVERVIEW

The Fire Training Area (FT-002)/Industrial Area Groundwater Operable Unit is a combination of the groundwater operable units from several sites that are impacted by groundwater contamination from the Fire Training Area. It extends from the Fire Training Area site to the west (also referred to as site FT-002), to the base boundary on the east. The primary source for groundwater contamination is the FT-002 site. Other sites whose groundwater operable units are combined with FT-002 within this operable unit include sites SS-004, SS-005, SS-006, SS-011, SS-017, and SD-041. These sites lie in the industrial corridor east of the flightline. Contaminant levels are the highest in what is referred to as the plume core. It contains greater than 1,000 parts per billion of chlorinated hydrocarbons.

Some of the key concepts that have been developed through the various investigations into the geology and groundwater contamination are: 1) chlorinated hydrocarbon contamination is migrating in the sand aquifer but is not present in the bedrock aquifer, because of the clay layer situated in between the two aquifers; 2) contamination is entering the Golf Course drainage system. Although the contaminant levels are expected to increase slightly in the future, concentrations are not expected to exceed New York State surface water quality criteria; 3) contamination is also entering the WSA drainage system. Only a portion of the drainage system contains concentrations of contaminants above New York State criteria; and 4) contamination is not expected to migrate beyond base boundaries in surface water or in groundwater.

The Air Force conducted health risk assessments for humans and the environment and found that there are no risks to human health resulting from contamination in the groundwater, except in the case of potable use of the groundwater. However, a municipal water supply is available on base, and off-base potable users are not expected to be affected by the contamination. There is a potential risk to fish species, such as trout, in a portion of the WSA stream.

A feasibility study was undertaken to evaluate options to address the Fire Training Area (FT-002)/Industrial Area Groundwater Operable Unit. The study combined various technologies for cleanup of the groundwater into sixteen (16) alternatives. The alternatives were evaluated against nine (9) criteria established by federal regulations to assess remedial alternatives. They are: 1) overall protection of human health and the environment; 2) compliance with "Applicable and/or Relevant and Appropriate Requirements" (ARARs), which are contaminant concentration levels established by New York State or federal laws governing cleanup of contaminated groundwater; 3) long-term effectiveness and permanence; 4) reduction of toxicity, mobility, or volume; 5) short-term effectiveness; 6) implementability; 7) cost; 8) state acceptance; and 9) community acceptance.

Because it provides the best balance between effectiveness and cost, the Air Force is recommending that Alternative 13 be selected as the remedy for the Fire Training Area (FT-002)/Industrial Area Groundwater Operable Unit. The components of the preferred alternative are: 1) institutional controls that would prohibit withdrawal of the groundwater for potable use, control the discharge of groundwater withdrawn during construction, and prohibit land use that interferes with remedial operations; 2) the construction of a collection trench between the runway and the flightline; 3) groundwater extraction wells; 4) a groundwater treatment system to treat water from the extraction wells and the runway collection trench, discharging to the WSA streams; 5) a collection trench installed east of the flightline; 6) a permeable treatment wall along Idaho Avenue with a contingency for a collection trench in lieu of the wall; 7) a permeable treatment wall at the WSA; 8) monitoring of the groundwater and the surface water; and 9) five-year site reviews.

B. PUBLIC MEETING AND PUBLIC COMMENT PERIOD

A Public Meeting was held on the recommended alternative for the Fire Training Area (FT-002)/Industrial Area Groundwater Operable Unit on February 4, 2002, at 7:00 p.m. It was held at the Old Court House in the City of Plattsburgh, County of Clinton, NY. A prepared statement was read by Mr. Michael D. Sorel, PE, the Site Manager/Base Realignment and Closure (BRAC) Environmental Coordinator for the Air Force Base Conversion Agency (AFBCA). Mr. Bruce Przybyl of URS Greiner detailed the proposed plans for the audience. The floor was then opened to the public for questions and comments. Concluding the meeting was a statement by Mr. Sorel that additional comments could be sent to the Air Force. As advertised in the Plattsburgh *Press-Republican*, the public comment period ran from January 22, 2002, to February 20, 2002. The Public Meeting was recorded by Ms. Carol Boone, a court reporter of Court Reporters Associates, Burlington, Vermont.

C. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES

Mr. Phil Von Bargen wanted to know if the Air Force had addressed, in the remedy or elsewhere, the issue regarding the (Town of Plattsburgh) municipal workers potentially being exposed to the contaminant plume while working in the area.

The Air Force responded that the issue was addressed in an earlier study conducted by the Air Force. Copies were handed out to Restoration Advisory Board (RAB) members and forwarded to the Town of Plattsburgh. The Air Force has made provisions to have groundwater collected during construction activities treated with a portable treatment system, as necessary.

Mr. Von Bargen asked if there were provisions in the review process to address anything out of the ordinary that might occur before the five-year assessment.

The Air Force clarified that the plume will be monitored once or twice a year, so there would be an opportunity to catch any increases in concentrations, or anything unexpected regarding site conditions. The five-year review is simply a more formalized presentation of the ongoing monitoring.

Mr. Dan Geraghty of the New York State Department of Health (NYSDOH) added that the state also receives copies of the monitoring results and can review construction plans in light of plume conditions.

Mr. Von Bargen wanted to be sure he understood that there is coordination between the Air Force and the regulatory agencies for the site.

The Air Force affirmed this statement. The current landfill monitoring was given as an example. The Air Force routinely forwards the documents to the state, and so far, no comments have been received to indicate that there are issues. The NYSDOH confirmed this.

NYSDOH also cited an example whereby the filters on an off-base residential water well indicated that there had been breakthrough. The New York State Department of Environmental Conservation (NYSDEC) was informed and had the filters changed.

No other questions were asked regarding the recommended alternative for the Fire Training Area (FT-002)/Industrial Area Groundwater Operable Unit. Additionally, there were no other comments from any members of the audience regarding the recommended alternative chosen for this site.

From the time of the Public Meeting until the deadline of February 20, 2002, only one other comment was directed to AFBCA. Mr. Robert Booth, of Plattsburgh, NY, forwarded a letter to the Air Force on February 7, 2002. Mr. Booth stated that he is a member of the Plattsburgh AFB RAB. He commented that, in his opinion, the RAB has

been thoroughly briefed on the Fire Training Area/FT-002(GW) Operable Unit (and all other projects), that there has been ample time for questions, answers, and discussions between the RAB and the Air Force; that the Air Force has been responsive to the RAB's concerns; and that the Air Force's preferred alternative will adequately protect the community. He added that working in conjunction with the EPA and NYSDEC has further convinced him that the process has produced the best possible result. Mr. Booth ended his letter by stating that the projects are well done and should be implemented as recommended.

Subsequent to Mr. Booth's letter, no further questions or comments were received by the Air Force regarding this subject during the public comment period.

MICHAEL D. SOREL, PE
Site Manager/
BRAC Environmental Coordinator